Chapter 3
ALTERNATIVES

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Chapter 3 describes the alternatives evaluated in this Complex Transformation Supplemental Programmatic Environmental Impact Statement *(SPEIS). Chapter 3 begins with an overview of the alternatives and a description of the process the National Nuclear Security Administration (NNSA) used to develop the reasonable alternatives for this SPEIS. The majority of Chapter 3 describes the programmatic and project-specific alternatives. Chapter 3 also discusses alternatives that were considered and subsequently eliminated from detailed evaluation. The chapter concludes with a summary comparison of the environmental impacts associated with the alternatives and identifies NNSA's preferred alternative. A more detailed description of the alternatives is contained in Appendix A.*

3.0 OVERVIEW

This *Complex Transformation Supplemental Programmatic Environmental Impact Statement* (SPEIS) evaluates alternatives for transforming NNSA's nuclear weapons complex into one which is smaller, more efficient, and that can respond to changing national security challenges. A more responsive Complex would help ensure the long-term safety, security, and reliability of the nuclear weapons stockpile while reducing the possibility that the United States would need to resume nuclear testing.

3.1 DEVELOPMENT OF REASONABLE ALTERNATIVES

NNSA has been considering how to continue the transformation of the Complex since the Nuclear Posture Review was transmitted to Congress in early 2002. The Stockpile Stewardship Conference in 2003 (DoD 2003), the Department of Defense Strategic Capabilities Assessment in 2004 (DoD 2004), the recommendations of the Secretary of Energy Advisory Board Task Force on the Nuclear Weapons Complex Infrastructure in 2005 (SEAB 2005), and the Defense Science Board Task Force on Nuclear Capabilities in 2006 (DoD 2006) were considered by NNSA in this regard. In 2006, NNSA developed a planning scenario for the future of the Complex (NNSA 2006). As a result of these studies, NNSA developed a range of reasonable alternatives that could reduce in size, capacity, number of sites with Category I/II SNM (and locations of Category I/II SNM within sites), and eliminate redundant activities.

Planning for Complex Transformation includes evaluation of alternatives for approximately the next decade or so, as well as decisions NNSA has already made based on the evaluations in the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SSM PEIS), Tritium Supply and Recycling PEIS, and other *National Environmental Policy Act* (NEPA) documents (see Section 1.5). NNSA developed the proposed actions and alternatives (described in Sections 3.3 through 3.13) that are analyzed in this SPEIS based on its consideration of developments in nuclear and national security and on comments received during scoping. In addition to the environmental analyses of the impacts of these alternatives, NNSA has completed detailed economic studies of the alternatives (TechSource 2007a, 2007b, 2007c, 2007d, 2008a, 2008b, 2008c, 2008d, 2008e, 2008f, 2008g), which are available to the public.

3.1.1 Restructure SNM Facilities

The following functional capabilities are evaluated in this SPEIS:

- Plutonium operations, including pit manufacturing; Category I/II SNM storage; and related R&D;
- Enriched uranium operations, including canned subassembly manufacturing, assembly, and disassembly; Category I/II SNM storage; and related R&D; and
- Weapons assembly and disassembly (A/D) and high explosives (HE) production.

To consolidate SNM facilities, which would be a long-term process carried out over a decade or more, the SPEIS alternatives address broad issues such as where to locate those facilities and whether to construct new or renovate existing facilities for these functions. As such, this SPEIS analysis is “programmatic” for the proposed action to restructure SNM facilities, meaning that tiered, project-specific NEPA documents could be needed to inform decisions on these facilities if existing site-wide EISs or other NEPA documents were insufficient.

As shown on Figure 3.1-1, these “programmatic alternatives” are:

- **No Action Alternative.** NNSA evaluated a No Action Alternative, which represents continuation of the status quo including implementation of past decisions. Under the No Action Alternative, NNSA would not make additional major changes to the SNM missions now assigned to its sites.

- **Programmatic Alternative 1: Distributed Centers of Excellence (DCE).** As described in Section 3.5, the DCE Alternative would locate the three major SNM functional capabilities (plutonium, uranium, and weapon assembly/disassembly) involving Category I/II quantities of SNM at two or three separate sites. This alternative would create a consolidated plutonium center (CPC) for R&D, storage, processing, and manufacture of plutonium parts (pits). Production rates of 125 pits per year for single shift operations and 200 pits per year for multiple shifts and extended work weeks are assessed for a CPC.[1] A CPC could consist of new facilities, or modifications to existing facilities at one of the following sites: Los Alamos,[2] NTS, Pantex, SRS, and Y-12. This SPEIS also evaluates an alternative that would upgrade facilities at Los Alamos to produce up to 80 pits per year. Highly-enriched uranium storage and uranium operations would continue at Y-12. As part of this alternative, a new Uranium Processing Facility (UPF) and an upgrade to existing facilities at Y-12 are both analyzed. The weapons Assembly/Disassembly/High Explosives (A/D/HE) mission would remain at Pantex.

- **Programmatic Alternative 2: Consolidated Centers of Excellence (CCE).** As described in Section 3.5, NNSA would consolidate the three major SNM functions (plutonium, uranium, and weapon assembly/disassembly) involving Category I/II quantities of SNM at one or two sites under this alternative. Two options are assessed: (1)

[1] See Section 3.15 for a discussion of a new CPC with a smaller capacity.
[2] In general, when referring to the Los Alamos National Laboratory, this SPEIS refers to this site as “LANL.” The term “Los Alamos” is used to describe this site as an alternative location for a CPC or Consolidated Nuclear Production Center (CNPC).

the single site option (referred to as the consolidated nuclear production center [CNPC] option); and (2) the two-site option (referred to as the consolidated nuclear centers [CNC] option). The CCE alternative assesses three major facilities: (1) a CPC; (2) a consolidated uranium center (CUC), which would be similar to the UPF but would also include HEU storage and non-nuclear support functions; and (3) an A/D/HE Center, which would assemble and disassemble nuclear weapons and fabricate high explosives. Under the CNPC option, a new CNPC could be established at Los Alamos, NTS, Pantex, SRS, or Y-12. The SPEIS analyzes the impacts of each of these facilities separately and in combination. If Pantex or Y-12 were not selected for this option, weapons operations at Pantex, Y-12, or both would cease. Under the CNC option, the plutonium and uranium component manufacturing missions could be separate from the A/D/HE mission. The A/D/HE functions could remain at Pantex or be transferred to the NTS, while the plutonium and uranium missions could be located at sites different than the A/D/HE function. The CCE Alternative assumes production rates of 125 weapons per year for single shift operations and 200 weapons per year for multiple shifts and extended work weeks.[3]

- **Programmatic Alternative 3: Capability-Based Alternative.** As described in Section 3.6, under this alternative NNSA would maintain a basic capability for manufacturing components for all stockpile weapons, as well as laboratory and experimental capabilities to support stockpile decisions, but would reduce production facilities in-place to the extent that would allow NNSA to produce a nominal level of replacement components (approximately 50 components per year). Under this alternative, pit production capacity at LANL would not be expanded beyond the capability to produce 50 pits per year. Production capacities at Pantex, Y–12, and the SRS would be reduced to similar levels.[4] Within this alternative, NNSA also added a No Net Production/Capability-Based Alternative, in which NNSA would maintain capabilities to continue surveillance of the weapons stockpile, produce limited life components, and continue dismantlement. This alternative involves a minimum production (production of 10 sets of components or assembly of 10 weapons per year).

[3] See Section 3.15 for a discussion of a new CNPC with a smaller capacity.
[4] A capability-based capacity is defined as the capacity inherent in facilities and equipment required to manufacture up to 50 pits per year. In the Notice of Intent for this SPEIS, this capacity was referred to as a "nominal capacity."

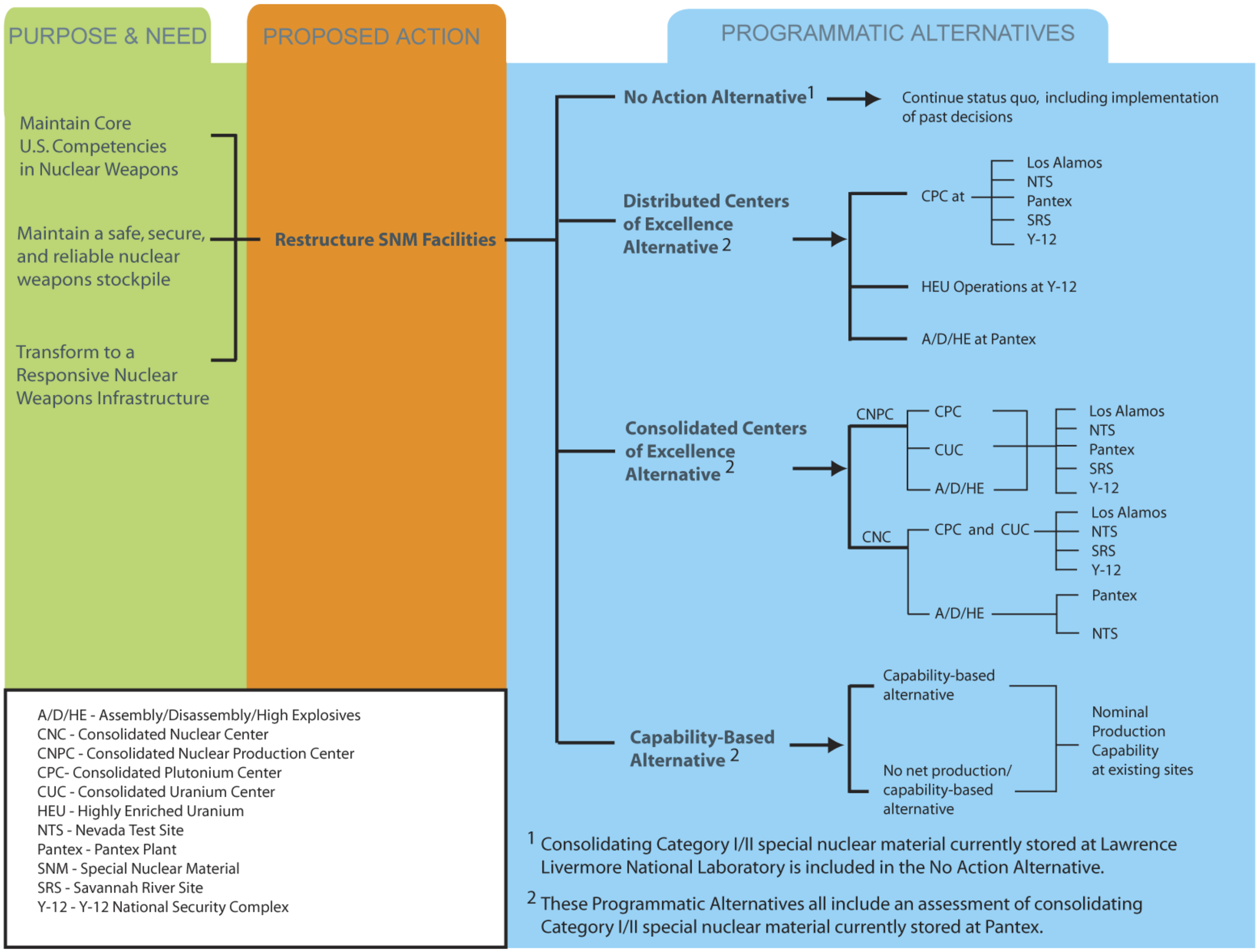

Figure 3.1-1—Programmatic Alternatives

The DCE Alternative, CCE Alternative, and the Capability-Based Alternative all include proposals to reduce the amount of SNM currently stored at LLNL[5] and Pantex. Those proposals are described in Section 3.7.

3.1.2 Restructure R&D and Testing Facilities

In pursuit of a more responsive and cost-effective Complex, NNSA is considering a restructuring of the R&D and testing facilities within the Complex. For this proposed action, the alternatives focus on near-term actions to consolidate, relocate, or eliminate facilities and programs and improve operating efficiencies. The following functional R&D capabilities and capacities are being evaluated:

- High Explosives R&D
- Tritium R&D
- Flight Test Operations
- Major Hydrodynamic Testing
- Major Environmental Testing

> **Project-Specific Analysis**
>
> A project-specific analysis is a detailed analysis of the environmental impacts of a pro-posed action and the reasonable alternatives. The project-specific analysis is sufficiently detailed to allow implementation of the selected alternative after NNSA makes a decision, without any additional NEPA analysis.

The analysis of alternatives for these capabilities is “project specific,” meaning that no further NEPA review would likely be needed to implement decisions consistent with the alternatives analyzed in this SPEIS. Restructuring of these facilities is expected to be pursued regardless of which programmatic alternative is selected for SNM facilities. NNSA developed the project-specific alternatives, shown on Figure 3.1-2, to achieve significant benefits in making the Complex more secure and efficient. In addition to these project-specific alternatives for restructuring R&D and testing, this SPEIS also addresses alternatives related to non-nuclear component design and engineering work at SNL/CA.

In order to develop these alternatives, NNSA created Integrated Project Teams (IPTs). The charter of the IPTs was to identify actions that could be taken to achieve downsizing, consolidate activities, eliminate duplicative and excess facilities, or otherwise make an activity more efficient and cost effective. The membership of each IPT consisted of experts in relevant operations around the Complex.

The IPTs evaluated the functional capabilities identified above. These alternatives were identified as those that offered the greatest potential to significantly improve the security or efficiency of the Complex to allow NNSA to better accomplish its mission. The IPTs developed

[5] The LLNL SWEIS (DOE 2005a) assesses the environmental impacts of transporting SNM to and from LLNL and other NNSA sites, SRS, and WIPP. That analysis includes consideration of transportation activities involving greater quantities of SNM and more shipments than are proposed in this SPEIS. As such, the transportation activities associated with consolidating SNM from LLNL are included in the existing No Action Alternative and can proceed without additional NEPA analysis. For completeness, however, this SPEIS includes the environmental impacts associated with such actions.

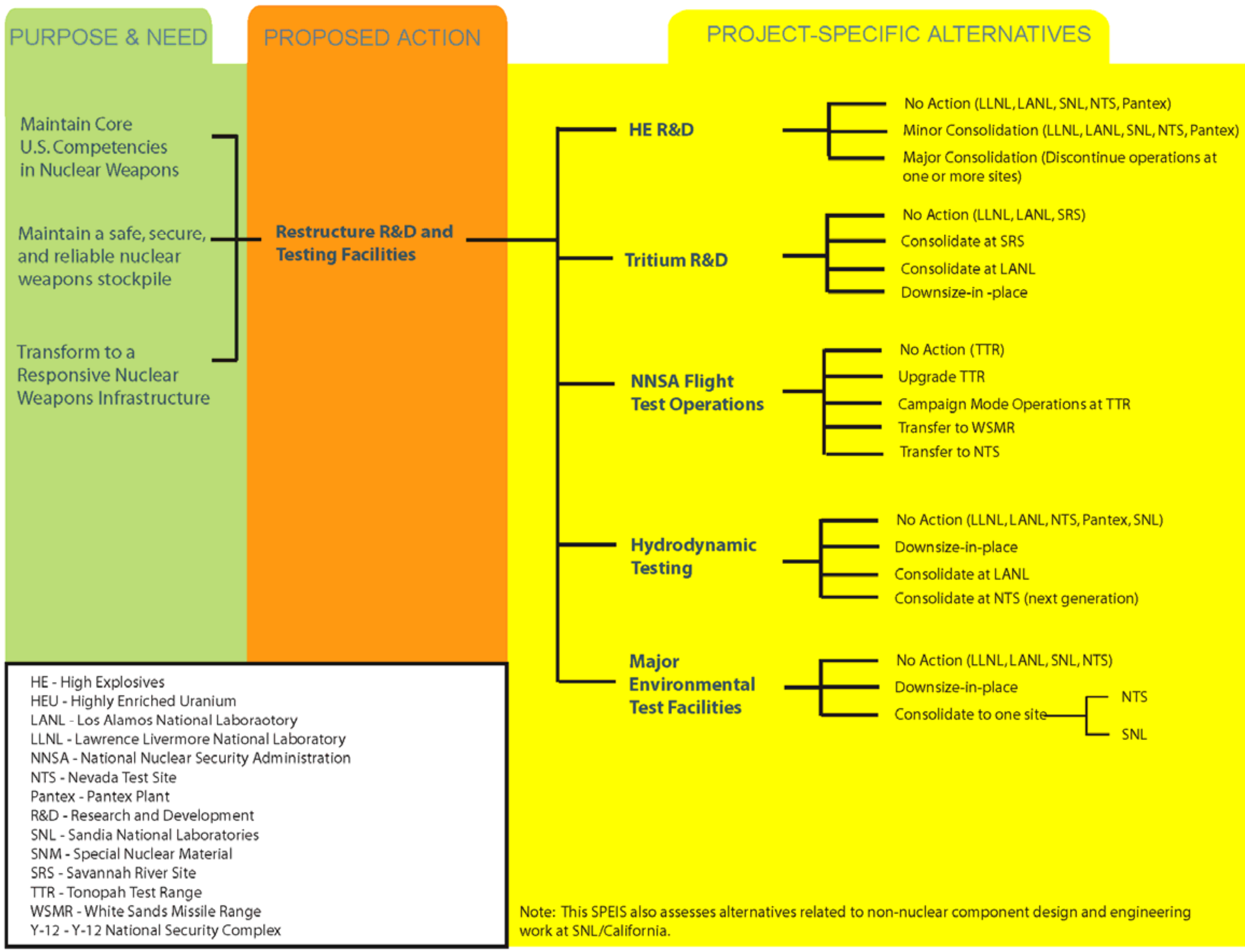

Figure 3.1-2—Alternatives to Restructure R&D and Testing Facilities

an assessment of the requirements for each mission area, conceptualized ways to meet those requirements while making the Complex more secure and efficient. The IPTs developed the proposals and the alternatives that would restructure R&D and testing facilities. Those alternatives are described in Sections 3.8 through 3.13.

3.2 OVERVIEW OF POTENTIALLY AFFECTED SITES AND EXISTING MISSIONS

3.2.1 Los Alamos National Laboratory

LANL was established as a nuclear weapons design laboratory in 1943. Its facilities are located on approximately 25,600 acres about 25 miles northwest of Santa Fe, New Mexico. LANL is a multidisciplinary research facility engaged in a variety of programs for NNSA, DOE, other government agencies, and the private sector. Its primary missions are the Stockpile Stewardship Program, emergency response to nuclear incidents, arms control, nuclear nonproliferation, and environmental clean-up. LANL conducts research and development in the basic sciences, mathematics, and computing applicable to its NNSA missions and to a broad range of other activities including: non-nuclear defense; nuclear and non-nuclear energy; material science; atmospheric, space, and earth sciences; bioscience and biotechnology; and the environment. Table 3.2.1-1 lists LANL's current missions.

With regard to nuclear weapons, LANL is responsible for the design of the nuclear explosive package in certain U.S. weapons (LLNL has this responsibility for the other weapons).[6] LANL performs research, design, development, testing, surveillance, and assessment activities, and maintains certification capabilities in support of the SSP. In addition, LANL produces a small number of plutonium pits pursuant to a programmatic decision based on the SSM PEIS (61 FR 68014) and a site-specific decision based on the 1999 LANL SWEIS (64 FR 50797) to establish an interim production capability of up to 20 pits per year. LANL also conducts surveillance of pits and manufactures some non-nuclear components (e.g., detonators). NNSA completed a revised LANL SWEIS in 2008, but will not make any decisions related to pit production at LANL prior to the completion of this SPEIS.

NNSA issued a ROD for the continued operation of LANL on September 23, 2008. NNSA announced in the ROD its decision to continue the no action alternative with the addition of some elements of the expanded operations alternative that NNSA concluded needed to be implemented to support the safe and successful execution of the laboratory's mission. None of these decisions affect the alternatives considered in this SPEIS.[7]

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[6] The general responsibilities assigned to LLNL and LANL for nuclear explosive packages are complementary. LANL and LLNL compete for assignment of responsibility for design and development of the nuclear explosive package for a nuclear weapons system. In the early design definition phase, both laboratories perform systems studies, preliminary development work, and initial design definition. NNSA, in consultation with the DoD and the cognizant military service, then selects either LANL or LLNL to work with SNL to design and develop the new weapon system. LANL or LLNL designs and develops the nuclear physics package and associated support hardware; SNL designs and develops the arming, fuzing, and firing system; other warhead electronics; and external cases and mounts. SNL also performs systems integration to develop the complete system. There are nuclear explosive packages in the current legacy stockpile that have been designed and developed by both LANL and LLNL.

[7] See ROD for the continued operation of the LANL for decisions from the expanded operations alternative (see 73 FR 55833).

Table 3.2.1-1—Current Major Missions–LANL

Mission	Description	Sponsor
Nuclear Weapons	Stockpile stewardship; nuclear design and engineering; pit production and surveillance; limited non-nuclear component production; HE R&D; hydrodynamic testing; tritium R&D	NNSA's Office of Defense Programs
Arms Control and Nonproliferation	Intelligence analysis; technology R&D; treaty verification; fissile material control; nonproliferation analysis	NNSA's Office of Defense Nuclear Nonproliferation
Energy Research, Science and Technology	Neutron science; scientific computing; fusion energy; health and environmental research; high energy and nuclear physics; basic energy sciences; modeling and simulation	DOE's Office of Science; DOE's Office of Nuclear Energy (NE)
Energy Technology	Solar Cells; Fuel Cells; Shale Oil Detection;	DOE's Office of Energy Efficiency and Renewable Energy (EE)
Environmental	Environmental restoration; waste analysis, management, and treatment	DOE's Office of Environmental Management (EM) and NNSA[8]
Work for Others	Conventional weapons; computing, modeling, and simulation	DoD, Department of Homeland Security (DHS), and various other agencies
Bioscience and technology	Biothreat reduction through Biodetection and Bioforensics R&D	Health and Human Services; Center for Disease Control

3.2.2 Lawrence Livermore National Laboratory

LLNL was established as a nuclear weapons design laboratory in 1952. LLNL's main site is located on approximately 821 acres in Livermore, California. LLNL also operates a 7,000 acre "Experimental Test Site" known as Site 300, which is located approximately 12 miles east of the main laboratory. Site 300 is used primarily for high explosives testing, hydrodynamic testing, and other experimentation, such as particle beam research.

LLNL is a multidisciplinary research facility engaged in a variety of programs for DOE, NNSA, other government agencies, and the private sector. Its primary mission is the SSP; emergency response to nuclear incidents, arms control, and nuclear nonproliferation activities. LLNL conducts research and development activities in the basic sciences, mathematics, and computing, applicable to its NNSA mission areas, and to a broad range of other programs including: non-nuclear defense; nuclear and non-nuclear energy; high-energy density physics; atmospheric, space, and earth sciences; bioscience and biotechnology; and the environment. Table 3.2.2-1 lists the current missions at LLNL. With respect to nuclear weapons, LLNL is responsible for the design of the nuclear explosive package in certain weapons (LANL has this responsibility for the other weapons). LLNL maintains research, design, development, testing, surveillance, assessment, and certification capabilities in support of Stockpile Stewardship.

Table 3.2.2-1—Current Major Missions–LLNL

Mission	Description	Sponsor
Nuclear Weapons	Stockpile stewardship; nuclear design and engineering; HE R&D; hydrodynamic testing; tritium R&D; stockpile surveillance	NNSA's Office of Defense Programs
Arms Control and Nonproliferation	Intelligence analysis; treaty verification; counter proliferation analysis; fissile material control	NNSA's Office of Defense Nuclear Nonproliferation

8 NNSA has responsibility for managing newly generated wastes.

Table 3.2.2-1—Current Major Missions–LLNL (continued)

Mission	Description	Sponsor
Energy, Research, Science and Technology	Scientific computing; fusion energy; health and environmental research; high energy and nuclear physics; basic energy sciences; nuclear safety	DOE's Office of Science; NE
Environmental	Environmental restoration; waste management and treatment	EM and NNSA
Work for Others	Conventional weapons; computing, modeling, and simulation; astrophysics and space science; microelectronics and optoelectronics	DoD and various other agencies
Radioactive Waste	Repository Studies	DOE's Office of Civilian and Radioactive Waste Management (RW)
Bioscience and Biotechnology	Biothreat reduction through microbiological and genome studies	NNSA; EPA; Health and Human Services; Center for Disease Control

3.2.3 Nevada Test Site

NTS occupies approximately 880,000 acres in the southeastern part of Nye County in southern Nevada. It is located about 65 miles northwest of Las Vegas. It is a remote, secure facility with restricted airspace that maintains the capability for conducting underground testing of nuclear weapons and evaluating the effects of nuclear weapons on military communications systems, electronics, satellites, sensors, and other materials. The first nuclear test at NTS was conducted in 1951. Since the signing of the *Threshold Test Ban Treaty* in 1974, it has been the only U.S. site used for nuclear weapons testing. The last nuclear test was conducted in 1992. Approximately one-third of the land (located in the eastern and northwestern portions of the site) has been used for nuclear weapons testing; one-third (located in the western portion of the site) is reserved for future missions, and one-third is reserved for R&D, nuclear device assembly, diagnostic canister assembly, and radioactive waste management. In addition, DOE has submitted an application to the Nuclear Regulatory Commission for authorization to construct and operate a repository for spent nuclear fuel and high-level radioactive waste at Yucca Mountain, an area on the southwestern boundary of the site.

A primary NNSA mission at NTS is the nuclear weapons SSP, and includes maintaining the readiness and capability to conduct underground nuclear weapons tests within 24-36 months if so directed by the President. Other aspects of stockpile stewardship at NTS include conventional HE tests, dynamic experiments, and hydrodynamic testing. The Search Augmentation Team maintains the readiness to respond to any type of nuclear emergency, including search and recovery for lost or stolen weapons, and conducts training exercises related to nuclear weapons and radiation dispersal threats. The Device Assembly Facility houses criticality machines and stores SNM in support of a range of NNSA missions. The current missions and functions of NTS are shown in Table 3.2.3-1.

Table 3.2.3-1—Current Major Missions–Nevada Test Site

Mission	Description	Sponsor
Nuclear Weapons Program	Stockpile stewardship activities, including maintenance of readiness to conduct underground nuclear tests, if directed	NNSA's Office of Defense Programs
Waste Management	Safe and permanent disposal of waste through disposal on NTS or to offsite commercial waste treatment or disposal facilities	EM, RW, and NNSA[9]
Environmental Restoration	Identification, reduction, and cleanup of contaminated areas	EM
Nondefense Research and Development	Original research efforts by DOE, other Federal agencies, and universities	DOE's Office of Science; EM and others
Work for Others	Provides for the use of NTS areas and facilities by other groups and agencies for activities such as military training exercises	DoD and various other agencies

3.2.4 Tonopah Test Range

The Tonopah Test Range (TTR), managed and operated by SNL, is a 179,200-acre site located at the very northern end of the Nevada Test and Training Range, about 32 miles southeast of Tonopah, Nevada. TTR is used for NNSA flight testing of gravity-delivered nuclear weapons (bombs). The actual flight tests are conducted with one or more denuclearized warheads, called joint test assemblies, which are dropped from DoD aircraft or simply flown over the test range. The primary purpose of evaluation activities is the timely detection and correction of problems in the hardware interfaces for gravity weapons, and to ensure that components conform to design and reliability requirements throughout their life. DoD also currently uses TTR for exercises and as an emergency divert base for aircraft.

3.2.5 Pantex Plant

Pantex is located approximately 17 miles northeast of Amarillo, Texas, on 15,977 acres. Its missions are research and development on chemical high explosives for nuclear weapons; fabrication of high-explosive components essential to nuclear weapon function; assembly, disassembly, maintenance, and surveillance of nuclear weapons in the stockpile; dismantlement of nuclear weapons retired from the stockpile; and interim storage of plutonium components from dismantled weapons. Weapons activities involve the handling (but not processing) of uranium, plutonium, and tritium components, as well as a variety of non-radioactive hazardous or toxic chemicals. The current Pantex missions and functions are listed in Table 3.2.5-1.

Pantex's mission is to assemble, disassemble, and modify weapons as set forth in the ROD for the *Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapons Components* issued on January 27, 1997 (62 FR 3880). Although the specifics of nuclear weapons operations at Pantex are classified, approximately one-half of the current and future Pantex workload involves dismantling nuclear weapons. Under all alternatives, dismantlement operations would continue and there are no proposals in this SPEIS to increase activity levels

9 NNSA has responsibility for managing newly generated wastes.

beyond those previously evaluated.[10] The current Pantex missions and functions are listed in Table 3.2.5-1.

Table 3.2.5-1—Current Major Missions–Pantex

Mission	Description	Sponsor
Weapons Assembly and Maintenance	Initial production, repairs, modifications and safety/technology updates of nuclear weapons	NNSA
Weapons Disassembly and Dismantlement	Disassembly and disposal of nuclear weapons and their materials in a manner to protect worker, public, and environmental safety.	NNSA
Evaluation of Weapons	Surveillance testing and evaluation of active system weapons to maintain reliability of the nation's stockpile.	NNSA
High Explosive Fabrication and Research and Development	Develop, fabricate, and research high explosives that surround the nuclear components of weapons.	NNSA
Interim Plutonium Pit Storage	Provide environmentally controlled, safe, and secure interim storage for plutonium pits.	NNSA
Waste Management	Provide waste management and decontamination and decommissioning activities	EM and NNSA[11]

3.2.6 Sandia National Laboratories

SNL was established as a non-nuclear design and engineering laboratory separate from LANL in 1949. The principal laboratory is located in Albuquerque, New Mexico (SNL/NM); a division of the laboratory (SNL/CA) is located in Livermore, California, near LLNL. Sandia Corporation (the contractor that operates SNL under contract with NNSA) also operates the TTR in Nevada.

SNL is engaged in a variety of programs for NNSA, DOE, other government agencies, and the private sector. Its primary missions for NNSA are implementation of the SSP and related systems engineering and non-nuclear component design and engineering, and system qualification testing in Stockpile-to-Target Sequence environments. Other missions involve arms control and nonproliferation activities. In addition, SNL conducts R&D activities in advanced manufacturing, electronics, information, pulsed power, energy, environment, transportation, and biomedical technologies.

SNL is responsible for cradle-to-grave oversight and qualification testing of the non-nuclear components in nuclear weapons as well as system integrator to assure the safety and reliability of the entire weapons system using computational methodologies combined with data from its test facilities. SNL maintains research, design, development, testing, surveillance, assessment, and certification capabilities in support of the SSP. In addition, SNL performs some non-nuclear manufacturing functions, including the fabrication of neutron generators and production of limited quantities of microelectronic parts. Table 3.2.6-1 lists current missions at SNL.

[10] In the Notice of Intent for this SPEIS, NNSA stated that the proposed action would accelerate nuclear weapons dismantlement activities; these activities are already occurring. For example, during fiscal year 2007, NNSA increased its rate of dismantling nuclear weapons by 146 percent over the previous year's rate (NNSA 2007a). This rate was well below the maximum number of weapon dismantlements analyzed in the Pantex SWEIS (DOE 1996c).

[11] NNSA has responsibility for managing newly generated wastes.

Table 3.2.6-1—Current Major Missions–SNL

Mission	Description	Sponsor
Defense Programs and Nuclear Weapons	Stockpile stewardship; non-nuclear design and engineering; system qualification for weapons systems; R&D; modeling and simulation; maintenance of national security readiness; limited non-nuclear component production	NNSA's Office of Defense Programs
Arms Control and Nonproliferation	Intelligence support; treaty verification; nonproliferation technology; reduce threat of nuclear accidents	NNSA's Office of Defense Nuclear Nonproliferation
Energy, Research, Science and Technology	Energy infrastructure enhancements, including electric, geothermal, solar, wind and photovoltaic; coal, gas and petroleum; fusion; basic energy sciences	EE; DOE's Office of Fossil Energy (FE); and DOE's Office of Science
Environmental	Environmental restoration; waste management; hazardous material transport systems engineering	EM and NNSA[12]
Work for Others	Conventional weapons; computing, modeling, and simulation; satellites; arming, fusing, and firing systems; probabilistic risk assessment; transport packaging	DoD and various other agencies

3.2.7 White Sands Missile Range[13]

The White Sands Missile Range (WSMR), located in south-central New Mexico, is the largest installation in the DoD. WSMR is a Major Range and Test Facility Base under the Department of the Army Test and Evaluation Command, Developmental Test Command, providing test and evaluation services to the Army, Air Force, Navy, other government agencies, and industry. The range covers more than 3,000 square miles of land and 10,026 square miles of contiguous restricted airspace fully managed, scheduled, and controlled by the WSMR. Holloman Air Force Base is located adjacent to the range's east boundary, and has capabilities for aircraft support and staging. WSMR has a full suite of flight test instrumentation including radar, telemetry, and optical equipment that would allow for complete coverage of a NNSA gravity weapons flight test. WSMR has extensive experience conducting flight tests with requirements and flight test scenarios similar to the NNSA flight test program.

3.2.8 Savannah River Site

SRS is located in south-central South Carolina and occupies approximately 198,420 acres in Aiken, Barnwell, and Allendale counties. The site was established in 1950 and is approximately 15 miles southeast of Augusta, Georgia, and 12 miles south of Aiken, South Carolina. The major nuclear facilities at SRS have included fuel and target fabrication facilities, nuclear material production reactors, chemical separation plants used for recovery of plutonium and uranium isotopes, a uranium fuel processing area, and the Savannah River National Laboratory, which provides technical expertise. The initial mission at SRS was production of heavy water and

[12] NNSA has responsibility for managing newly generated wastes.
[13] WSMR is not currently part of the NNSA nuclear weapons complex. However, NNSA is considering WSMR as a location for flight testing.

strategic radioactive isotopes (plutonium-239 and tritium) in support of national defense. Today, the main weapons mission at SRS is tritium supply management and R&D.

Tritium, an important component of nuclear weapons, decays and must be replaced periodically to meet weapons specifications. Tritium recycling facilities empty tritium from weapons reservoirs, purify it to eliminate the helium decay product, and fill replacement reservoirs with specification tritium for nuclear stockpile weapons. Filled reservoirs are delivered to Pantex for weapons assembly and to the DoD as replacements for weapons reservoirs. The Tritium Extraction Facility takes rods, which have been irradiated in a commercial light water reactor, and extracts tritium for use in the nation's nuclear weapons. As an NNSA-managed activity separate from weapons activities, a mixed oxide fuel fabrication facility is under construction and NNSA plans to build a pit disassembly and conversion facility at SRS to disposition surplus plutonium. The current missions at SRS are shown in Table 3.2.8-1.

Table 3.2.8-1—Current Major Missions–Savannah River Site

Mission	Description	Sponsor
Tritium Supply Management and R&D Support	Operate H-Area tritium facilities and Tritium Extraction Facility; conduct tritium R&D; evaluate reservoir components returned from the stockpile	NNSA
Research and Development	Savannah River National Laboratory; technical support for NNSA, EM, and NE	NNSA; EM; and NE
Waste Management	Operate waste processing facilities	EM and NNSA[14]
Environmental Monitoring and Restoration	Operate remediation facilities	EM
Energy Technology	R&D of hydrogen (production, separation, and storage) as an energy source	EE
Stabilize Targets, Spent Nuclear Fuels, and Other Nuclear Materials	Operate F- and H- Canyons	EM
SNM Disposition	Build and operate facilities for SNM disposition	NE and NNSA's Office of Defense Nuclear Nonproliferation

3.2.9 Y-12

Y-12 is one of three primary installations on the DOE Oak Ridge Reservation (ORR), which covers a total of approximately 35,000 acres in Oak Ridge, Tennessee. The other installations are the Oak Ridge National Laboratory (ORNL) and the East Tennessee Technology Park (formerly the Oak Ridge K-25 Site). Construction of Y-12 started in 1943 as part of the World War II Manhattan Project. Y-12 consists of approximately 800 acres. The early missions of the site included the separation of uranium-235 from natural uranium by the electromagnetic separation and the manufacture of weapons components from uranium and lithium. Today, as one of the NNSA major production facilities, Y-12 is the primary site for enriched uranium processing and storage,

> **Secondaries and Cases**
>
> Secondaries are components of nuclear weapons that contain elements needed to initiate the fusion reaction in a thermonuclear explosion. Cases confine the nuclear package.

[14] NNSA has responsibility for managing newly generated wastes from NNSA activities.

and one of the primary manufacturing facilities for maintaining the U.S. nuclear weapons stockpile. Y-12 is the only source of secondaries, cases, and certain other weapons components within the Complex. Y-12 also dismantles weapons components, safely and securely stores and manages SNM, supplies SNM to naval and research reactors, and dispositions surplus materials. The current missions and functions are listed in Table 3.2.9-1.

Table 3.2.9-1—Current Major Missions–Y-12

Mission	Description	Sponsor
Weapons Components	Fabricate uranium and lithium components and parts for nuclear weapons and test hardware	NNSA
Stockpile Surveillance	Evaluate components and subsystems returned from the stockpile	NNSA
Uranium and Lithium Storage	Store enriched uranium, depleted uranium, and lithium materials and parts	NNSA
Dismantlement	Dismantle nuclear weapon secondaries returned from the stockpile	NNSA
Environmental Restoration and Waste Management	Waste management and decontamination activities	ER; EH; NE; EM; and NNSA[15]
Work for Others	Provide specialized medical emergency, security technology, and protection strategy expertise to other federal agencies	DoD and various other agencies
Arms control and Nonproliferation	Conduct security technology R&D; technical support for material disposition; global threat reduction; fissile material control; nonproliferation analysis	NNSA's Office of Defense Nuclear Nonproliferation
Naval Reactors	Supply HEU for use as fuel in naval reactors	NNSA

[15] NNSA has responsibility for managing newly generated wastes.

PROGRAMMATIC ALTERNATIVES

3.3 PROGRAMMATIC NO ACTION ALTERNATIVE

Under the programmatic No Action Alternative, NNSA would continue operations to support national security requirements using the existing Complex. As shown on Figure 1.1-1, the current complex consists of multiple sites located in seven states (alternatives for the activities conducted at KCP, which manufactures and procures non-nuclear weapons components, are evaluated separately from this SPEIS). The Complex enables NNSA to design and manufacture nuclear weapons; conduct surveillance on weapons in the stockpile; and dismantle retired weapons. Under the No Action Alternative, NNSA sites would continue to perform the weapons functions identified in Section 3.2. A summary of the functions, and the sites where these functions are performed, follows.

Weapon design and certification. Nuclear weapons are designed at three NNSA national laboratories; these laboratories also certify the weapons safety and reliability. LLNL and LANL design and engineer the nuclear physics package for nuclear weapons. SNL designs and engineers non-nuclear components and is responsible for systems engineering and qualification of nuclear weapons. The laboratories provide the science and technology foundation for the SSP and rely on facilities across the Complex to support essential plutonium, uranium, non-nuclear materials, tritium, and high explosives research and development, as well as, hydrodynamic, environmental, and flight testing. NNSA would not close any of the three laboratories under this alternative (Section 3.14), but could consolidate some research and development and testing facilities to achieve a more integrated, interdependent, and cost-effective Complex.

Plutonium operations and pit manufacture. Pits are the central nuclear core of the primary of a nuclear weapon, and typically contain Pu-239 or HEU. Subsequent to the 1996 SSM PEIS ROD, an interim pit manufacturing capability was established at LANL. In the 1999 LANL SWEIS ROD, DOE decided that LANL would produce up to 20 pits per year. In May 2008, NNSA issued the Final LANL SWEIS that evaluates an alternative to produce up to 80 pits per year in order to obtain 50 certified pits per year. LANL manufactures pits in the Plutonium Facility Complex, which consists of six primary buildings located in Technical Area-55 (TA-55). This activity is supported by numerous laboratories, storage facilities, administrative offices and waste management facilities, located elsewhere at LANL. Both LANL and LLNL currently perform R&D on Category I/II quantities of plutonium.

Uranium operations and secondary and case fabrication. The energy released by the primary explosion activates the secondary assembly. Secondary assemblies may contain HEU, lithium deuteride, and other materials. Implosion of the secondary assembly creates the thermonuclear explosion. Heavy metal cases surround the secondary assemblies. Uranium operations and secondary and case fabrication are generally performed at Y-12, where most highly enriched uranium materials reserved for weapons are retained. NNSA has constructed a new Highly-Enriched Uranium Materials Facility (HEUMF) at Y-12 to consolidate highly-enriched uranium storage. LANL, LLNL, and NTS currently retain smaller Category I/II quantities of highly enriched uranium for R&D. This activity requires high security facilities as well as support, laboratory, waste management, and administrative facilities.

Weapons assembly/disassembly and high explosives production. Weapons assembly and disassembly refers to the assembly, dismantlement, and reassembly of complete nuclear weapons. This activity is primarily conducted at Pantex, which is the principal facility in the Complex that handles complete nuclear weapons. Facilities include heavily fortified work areas, storage facilities, administrative buildings and support laboratories. Waste management facilities are also required. Pantex also produces and machines the high explosives that surround the nuclear components of nuclear weapons. In the ROD for the EIS for the *Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapons Components* (62 FR 3880, January 27, 1997), Pantex is authorized to assemble, disassemble, and modify weapons. Although the specifics of nuclear weapons operations at Pantex are classified, approximately one-half of its current and future workload is associated with dismantling nuclear weapons.

Category I/II SNM storage. Quantities of SNM are categorized into security Categories I, II, III, and IV based on the type, attractiveness level, and quantity of material. Category I/II SNM are the most attractive materials and require the most extensive and expensive security protection. These facilities consist of heavily fortified storage or processing buildings surrounded by security fences with highly trained, heavily armed security personnel. Category I/II SNM storage facilities are currently located at LANL, LLNL, Pantex, SRS, Y-12, and NTS. In 2008, SNL/NM removed its Category I/II SNM, and no longer stores or uses Category I/II SNM quantities on a permanent basis. The potential transfer of LLNL's Category I/II SNM has previously been assessed in the LLNL SWEIS (DOE 2005a) and is included in the No Action Alternative.

Tritium production and R&D. Tritium is a short-lived radioactive isotope of hydrogen used to increase yield in nuclear weapons. The production of tritium is carried out in a Tennessee Valley Authority reactor (see Section 5.19). Tritium extraction, purification, and reservoir loading (which are collectively referred to as the "tritium supply management" missions) are carried out at SRS in the Tritium Extraction Facility, which became operational in late 2006, and the H-Area New Manufacturing Facility, which became operational in 1994. Tritium research and development is performed at SRS and LANL (in the Weapons Engineering Tritium Facility). Very limited tritium operations are performed at LLNL in the Tritium Facility within Superblock, to support preparation of tritium targets for the National Ignition Facility, and at SNL/NM in the Neutron Generator Production Facility for neutron generator production. Tritium operations require supporting laboratory facilities and administrative office buildings.

High explosives R&D. High explosives are used in the primary assembly of nuclear weapons. The development of safer, more stable, and more energetic forms of this material are referred to as high explosives research and development. The research and development work includes confined and unconfined detonation of experimental quantities of high explosives. High explosives research and development are conducted at LANL, LLNL, SNL/NM, Pantex, and NTS. This activity entails development laboratories, radiography facilities, environmental test facilities, administrative buildings and test fire facilities. Waste management facilities are also required.

Flight test operations. Flight test operations assess how weapon systems function in realistic delivery conditions. Denuclearized test weapons[16] are assembled at Pantex. These denuclearized weapons are then subjected to realistic aircraft flight and release conditions. This program is conducted at the TTR for gravity weapons (bombs). Facilities include a drop zone, target facilities, observation and test equipment, and administrative buildings. Flight testing for ballistic and cruise missiles is conducted at existing DoD test ranges.

Hydrodynamic test facilities. Hydrodynamic testing refers to experiments that use high explosives to study the physics of weapons and to assess their performance and safety. These activities are principally conducted at LLNL and LANL, with smaller supporting activities at NTS, SNL/NM and Pantex. High energy radiographic facilities support the hydrodynamic testing capabilities with dynamic radiography. This activity also entails laboratory and administrative office space.

Major environmental test facilities. Environmental test facilities are used to assess the safety, reliability and performance of the nation's nuclear weapons systems through subjecting weapons to differing environmental conditions (shock, vibration, high temperatures, etc.). These facilities test complete (denuclearized) weapons or major weapons subsystems. Major environmental test facilities are located at SNL/NM, LLNL, LANL, and NTS. These facilities are supported by storage, support laboratory, and administrative office buildings. Small environmental test laboratories and capabilities also exist at Pantex and SRS. These smaller test laboratories support component R&D and production, and are an integral part of the production/certification process.

3.3.1 Limitations of the Existing Complex

The existing Complex is aging, too big, and maintains redundant capabilities that were required for the Cold War stockpile. Many of the facilities are being operated beyond their anticipated life. In fact, parts of the Complex were built during the Manhattan Project of the 1940s. It is expensive to maintain these facilities. Reliance on aging facilities increases operating costs and in some instances subjects workers to unnecessary risks. The history of facility construction within the Complex is shown in Figure 3.3.1-1.

The chart shows that there were two periods of significant construction in the 1950s and the 1980s. Construction during these periods was primarily the result of expanding the production capacity as the nuclear weapons stockpile grew rapidly during the Cold War. There are several thousand buildings in the Complex today, covering more than 35 million square feet of floor space, that support weapons activities. Maintaining this much space requires the expenditure of extensive resources for maintenance, safety, and security. As shown on Figure 3.3.1-2, the Complex has undergone significant footprint reductions (approximately 50 percent) since the Cold War ended in 1991. NNSA is continuing to consolidate operations and reduce floor space and ongoing efforts in this regard would continue under the No Action Alternative.

[16] Denuclearized test weapons are designed to simulate the nuclear weapon in its operational configuration as much as possible, but do not contain the physics package with special nuclear materials. During flight tests, these test weapons are expected to operate as if they were an actual nuclear weapon, except for the lack of a nuclear detonation.

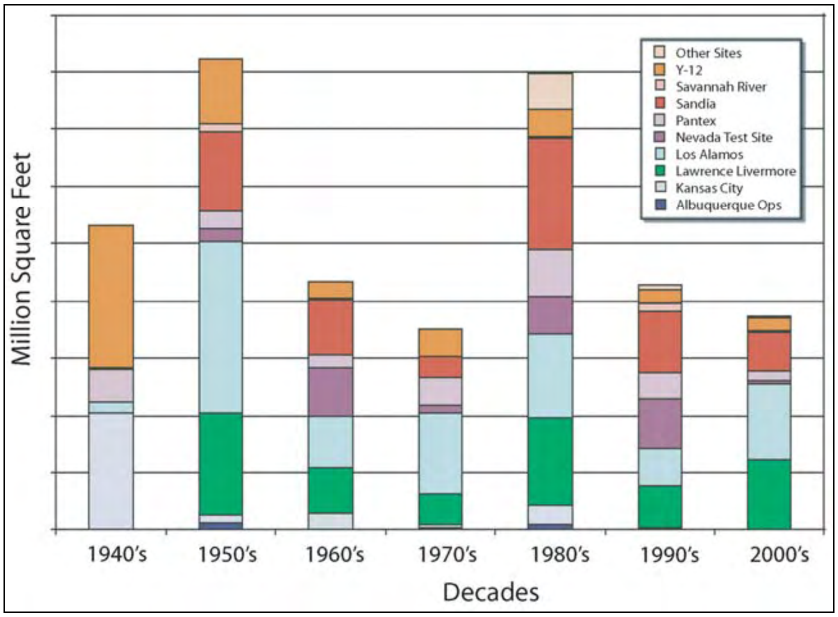


Figure 3.3.1-1—Facility Construction History within the Current Complex

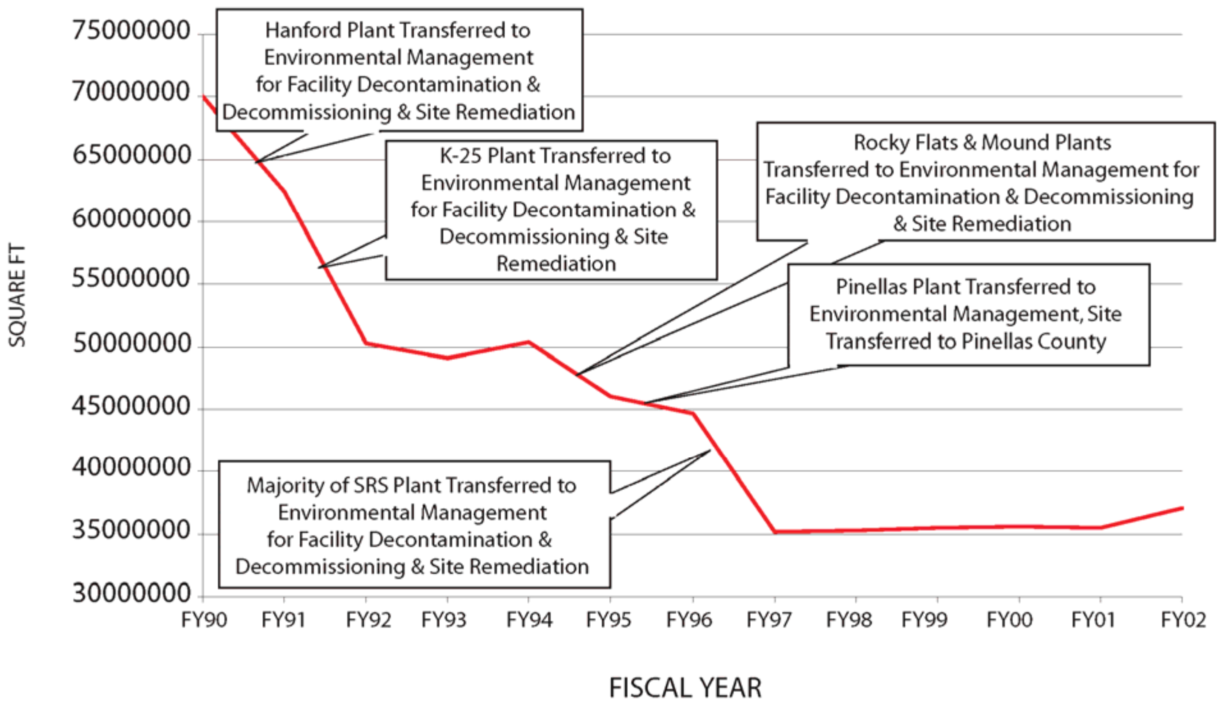


Figure 3.3.1-2—Footprint Reductions in the Complex Due to Mission Changes

While the functions required to sustain the U.S. nuclear deterrent are understood, the actual facilities that will be needed in the future will depend on a number of factors. NNSA anticipates the footprint of the current Complex could be reduced by 20-30 percent in the future. This would result in a footprint of less than 26 million square feet. Figure 3.3.1-3 presents possible reductions in the footprint of the Complex due to mission changes. As can be seen from the figure, nuclear facilities, office space, laboratory space, and indirect support would be significantly reduced. In 2006, approximately 27,000 management and operating contractor personnel were employed at major NNSA sites to support weapons activities. NNSA is continuing to consolidate operations and reduce floor space, on a site-by-site basis, and these efforts would continue under the No Action Alternative.

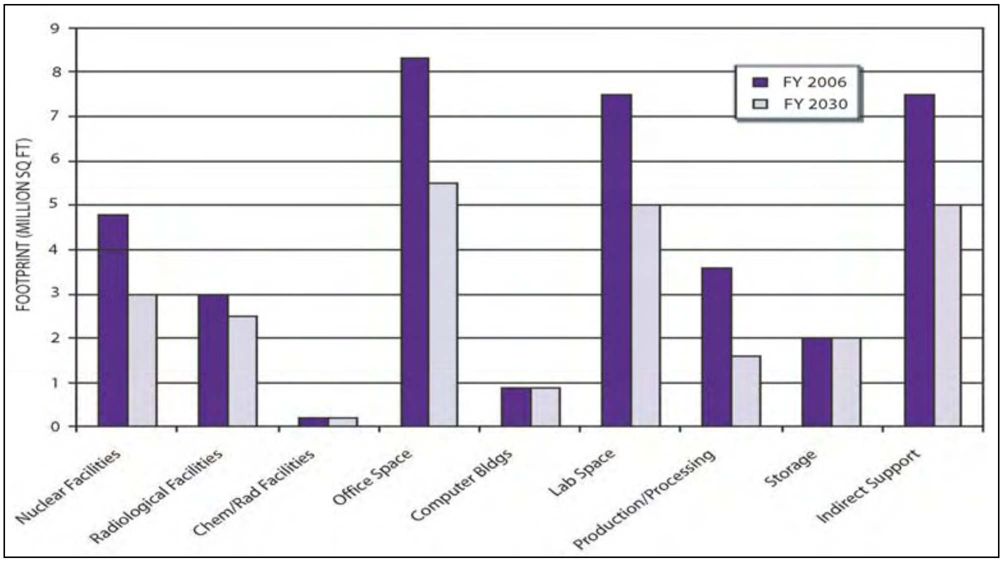


Figure 3.3.1-3—Possible Footprint Reductions in the Complex Due to Mission Changes

Another requirement of a geographically dispersed Complex and military bases is the need for a safe and reliable transportation system to move weapons components and other items. This function is provided by the Department's Office of Secure Transportation (OST) which transports nuclear weapons, components and special nuclear materials, and conducts other missions supporting national security. Since 1974, OST has operated a system for the safe and secure transportation of all government-owned, DOE controlled special nuclear materials in "strategic" or "significant" quantities. Shipments are transported in specially designed equipment, monitored closely with highly sophisticated satellite telemetry, and escorted by armed Federal Agents (Nuclear Material Couriers). Section 5.10.1 describes the existing transportation system (No Action Alternative) for the Complex.

3.4 PROGRAMMATIC ALTERNATIVE 1: DISTRIBUTED CENTERS OF EXCELLENCE

Under this alternative, NNSA would transform the Complex by consolidating major functions required to support the nuclear weapons stockpile at distributed centers of excellence (DCE). This alternative would locate the three major SNM functions (plutonium, uranium, and weapon assembly/disassembly) involving Category I/II quantities of SNM at two or three separate sites. This alternative would create a consolidated plutonium center (CPC) for the R&D, storage, processing, and manufacture of plutonium parts (pits) for the nuclear weapons stockpile. Production rates of 125 pits per year for single shift operations and 200 pits per year for multiple shifts and extended work weeks are assessed.[17] A CPC could either be a completely new configuration of buildings at Los Alamos, NTS, Pantex, SRS, or Y–12, or an upgrade of existing and planned facilities at Los Alamos (two alternatives, referred to as the “50/80” and “Upgrade”) or planned facilities at SRS. Highly Enriched Uranium (HEU) storage and uranium operations would continue at Y-12. As part of this alternative, a new Uranium Processing Facility (UPF) and an upgrade to existing facilities at Y-12 are analyzed. The weapons Assembly/Disassembly/High Explosives (A/D/HE) mission would remain at Pantex.

3.4.1 Consolidated Plutonium Center

The inception of the Cold War in the early 1950s led to the large-scale production of nuclear weapons. During this time, many facilities were constructed across the country to build nuclear weapons. One of these was the Rocky Flats Plant in Colorado. It commenced production of plutonium components for nuclear weapons, including pits, in 1952. From 1952 until 1989, the principal mission of Rocky Flats was the processing of plutonium and the fabrication of pits that went into the nuclear weapons stockpile.

In 1969 there was a major fire in one of the buildings at Rocky Flats and its cleanup took approximately two years. To prevent similar fires, the Department made many changes to both the equipment and processes used in the manufacture of pits. During the mid 1970s and the 1980s a series of events occurred that altered operations in the Complex: the enactment of major environmental legislation (including the *Resource Conservation and Recovery Act* [RCRA] and the *Comprehensive Environmental Response, Compensation and Liability Act* [CERCLA]); issuance of a Department of Energy Report (DOE 1988) recommending the phase-out of plutonium operations at Rocky Flats due to encroaching population as well as emerging information about the environmental contamination at the site.

In 1989, agents from the Federal Bureau of Investigation (FBI) and U.S. Environmental Protection Agency (EPA) secured the plant to investigate allegations of environmental crimes. Following this event, the production of pits ceased, never again to resume. In 1992, Rocky Flats was officially closed. The reasons for its closure were: encroaching communities; the requirement to conduct extensive environmental remediation; and the recognition that the nation did not need a facility the size of Rocky Flats to maintain the nuclear weapons stockpile.

In 1996, DOE issued a ROD following issuance of the SSM PEIS. The ROD announced DOE’s decision to “reestablish the capability, with an attendant small, interim capacity, for pit

[17] See Section 3.15 for a discussion of a new CPC with a smaller capacity.

fabrication at Los Alamos National Laboratory" (61 FR 68014). Also in that ROD, DOE stated that it would, at a later date, consider a larger capacity for the fabrication of pits than could be achieved in the facilities at LANL. In 2002, NNSA issued a notice of intent to prepare an EIS for a Modern Pit Facility (MPF) (67 FR 59577). While NNSA published a MPF Draft EIS, it never issued a final EIS. The analysis of proposed pit production is contained in this Complex Transformation SPEIS.

Only recently has NNSA regained the capability to manufacture pits for the stockpile, however, it is limited to a single pit type (W88) at the LANL plutonium facility within TA-55. In the 2008 Final LANL SWEIS (see Section 1.5.2.2), NNSA assessed an alternative that would increase this interim capacity. A CPC could be new construction or construction and modification of existing facilities (if LANL is the selected site). This section of this SPEIS describes the alternatives for a CPC. This section also discusses the pit production process, and lists the facility requirements necessary to this process. A new seismic study in the 2008 Final LANL SWEIS indicates that the seismic hazard at LANL is higher than previously understood. One of the purposes of that seismic hazards analysis is to define the Design Basis Earthquake (DBE) ground motion parameters. That data would then be used to determine the design parameters that any facility at LANL would need to meet and whether capacity could be increased in existing facilities.

CPC Requirements and Assumptions

- A CPC would provide the facilities and equipment to perform pit manufacturing, pit surveillance, and plutonium research and development.

- Stockpile requirements are based on national security requirements established by the President and funded by the Congress based on joint recommendations from DOE and DoD. CPC capacity and production output would be designed to meet national security requirements, which could include production of new pits for maintenance of the legacy stockpile or replacement weapons (e.g., Reliable Replacement Warheads [RRW]).

- As described in Chapter 2, this SPEIS assumes that a CPC would provide a manufacturing capacity of 125 pits per year using a single shift, with a contingency of 200 pits per year through multiple shifts and extended work weeks. A CPC would be capable of supporting the surveillance program at a rate of one pit being destructively evaluated per pit type in the stockpile per year. For Los Alamos, this SPEIS also assesses an alternative that would result in a smaller pit production capacity (up to 80 pits per year), based on the use of the existing and planned infrastructure at that site.

- A new CPC would be built and started up over a six year period, and would be fully operational by approximately 2022. A CPC would be designed for a service life of at least 50 years.

- The sites being considered as potential locations for a CPC and consolidation of Category I/II quantities of SNM are Los Alamos, NTS, Pantex, SRS, and Y–12.

- A newly constructed CPC would consist of a central core area surrounded by a Perimeter

Intrusion Detection and Assessment System (PIDAS), which would enclose all operations involving Category I/II quantities of SNM. The enclosed area would be approximately 40 acres. A buffer area would provide unobstructed view of the area surrounding the PIDAS. All administrative and non-SNM support buildings would be located outside of the buffer area. Once operational, approximate 110 acres would be required for a new CPC (Table 3.4-1). As shown in Table 3.4-1, two CPC alternatives at Los Alamos (Upgrade Alternative and 50/80 Alternative) could reduce land area requirements by the use of existing and planned facilities and infrastructure.

Table 3.4-1—Land Requirements–CPC Alternatives

	Construction (acres)	Operation (acres)	
Greenfield[18] Alternative (Los Alamos, NTS, Pantex, SRS, Y-12)	140	110*	
		PIDAS	**Non-PIDAS**
		40	70
Upgrade Alternative (Los Alamos)	13	6.5 (All within PIDAS)	
50/80 Alternative (Los Alamos)	6.5	2.5 (All within PIDAS)	

* Includes a buffer area that would provide unobstructed view of the area surrounding the PIDAS.

- It is assumed that CPC facilities would be constructed above ground. During design activities, studies would be performed on worker safety, security enhancements, and costs. For example, whether to locate the CPC facilities above or below-ground would be examined. All 5 sites are assumed to be able to support a buried or partially buried CPC. This SPEIS includes a discussion of the potential differences among the sites in supporting a buried or bermed facility (see Appendix A).

- If Los Alamos is not selected for the CPC mission, it is assumed that plutonium facilities at that site would be reduced to Category III or IV nuclear facilities for R&D purposes, or closed, after the CPC begins operations. Any residual non-Defense Program (DP) missions (i.e. Pu-238) that might use these plutonium facilities after NNSA's mission in those facilities ends will be responsible for the operation and maintenance of these facilities. However, as explained in Section 3.4.1.6, facilities at Los Alamos are also being considered for an upgrade to meet CPC requirements.

- SNM storage at the CPC would be based on the need to support a 3-month production period. Approximately 3 metric tons (MT) of storage is anticipated.

- Any transuranic (TRU) waste from a CPC is assumed to be disposed of at the Waste Isolation Pilot Plant (WIPP) (see Section 10.5.5).

3.4.1.1 *CPC Operations*

The following section discusses CPC operations. It begins with a summary of the pit production process. The overall process would involve three main areas: (1) Material Receipt, Unpacking,

[18] The term "greenfield" is not meant to imply that the land upon which a CPC would be constructed has never been previously utilized by DOE/NNSA. Rather, in the context of this SPEIS, greenfield refers to a completely new facility that would not use existing facilities and therefore requires significantly more acreage.

and Storage; (2) Feed Preparation; and (3) Manufacturing. In addition, a CPC would perform plutonium R&D and surveillance, as described below.

Material receipt, unpacking, and storage. Plutonium feedstock material would be delivered from offsite sources in DOE/Department of Transportation (DOT) approved shipping containers. The shipping containers would be held in Cargo Restraint Transporters (CRT) and hauled by Safeguards Transporters (SGTs). The bulk of the feedstock material would come from Pantex, in the form of pits from retired weapons. Additionally, small amounts of plutonium metal from LANL and SRS could be used.

Feed preparation. The containers would then be transferred through a secure transfer corridor to an adjacent Feed Preparation Area where plutonium metal is prepared for manufacturing. For pits that would be recycled, the pit is first cut in half and all non-plutonium components are removed. Notable among these components is EU, which would be decontaminated and then shipped to Y-12 for recycling. All of the other disassembled components would be decontaminated, to the maximum extent possible, and then disposed of as either low-level waste (LLW) or transuranic (TRU) waste, as appropriate.

There are two processes currently being evaluated for the purification of the plutonium metal. One process relies more heavily on aqueous chemistry (aqueous process) and the other on pyrochemical reactions (pyrochemical process). The primary difference between the two is that the aqueous process does not employ chloride, which means conventional stainless steel can be used to contain all of its reactions. On the other hand, the pyrochemical process requires specialized materials to contain the corrosive chloride-bearing solutions that it employs.

The pyrochemical process has the potential to be environmentally more benign than the aqueous process. As the design of a CPC develops and a final purification process is proposed, a site-specific EIS would evaluate in more detail the impacts of the process proposed for use. Additionally, for a CPC that might be constructed at SRS, this SPEIS considers using facilities and infrastructure that are to be constructed in support of the Materials Disposition Program. The Pit Disassembly and Conversion Facility (PDCF) would provide the capability to disassemble nuclear weapons pits and could be modified in the future to convert plutonium to a form suitable for producing new pits. The use of the PDCF would be consistent with the requirements of September 2000 *Agreement Between the Government of the United States and the Government of the Russian Federation Concerning the Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes and Related Cooperation* and any future modifications to this Agreement. The PDCF would include a hardened plutonium processing building, conventional buildings and structures housing support personnel, systems, and equipment (see Section 3.4.1.2).

Manufacturing. Pit manufacturing work includes fabrication of plutonium components for pits and the assembly of pits. Typically, non-plutonium parts would be fabricated elsewhere. These non-plutonium components would be shipped to the CPC to be assembled with the plutonium components into pits. The CPC would require the capability to perform SNM shipping, receiving, and storage; pit disassembly and feedstock sampling; metal preparation, recovery, and refining; product forming, machining, welding, cleaning, and assembly; and product inspection (including radiography), process qualification, production surveillance, and analytical chemistry support. Support and ancillary functions (waste handling, security operations, training, maintenance, administration, process development, and testing) required to perform pit manufacturing are also included in the CPC.

Plutonium R&D. A CPC would conduct plutonium R&D that would investigate the properties and performance characteristics of plutonium. Understanding the properties and performance characteristics allows better modeling of weapon performance and provides assurance of stockpile reliability. This R&D would also assess activities required for pit processing in order to develop more efficient and environmentally benign methods.

Plutonium pit surveillance. Pit surveillance is the periodic disassembly and inspection of pits from the active stockpile to identify any defects or degradation, and to assure that nuclear weapons are safe and reliable. Evaluations include leak tests, weighing, dimensional inspection, dye penetration inspection, ultrasonic inspection, radiographic inspection, metallographic analysis, chemical analysis, pressure tests, and mechanical testing.

3.4.1.2 *CPC Facility Requirements*

In order to allow for the pit production processes described above, a CPC would require a number of facilities. Although the specific requirements of these facilities are still being developed, the general requirements are:

Process and R&D buildings. An approach being evaluated for a CPC would divide the major plant components into four separate buildings identified as Material Receipt, Unpacking, and Storage; Feed Preparation; Manufacturing; and R&D to perform the functions described in Section 3.4.1.1. The process buildings would be two-story reinforced concrete structures located aboveground. The exterior walls and roofs would be designed to resist all credible man-made and natural phenomena and comply with all security requirements. The first story of each building would include plutonium processing areas, manufacturing support areas, waste handling, control rooms, and support facilities for operations personnel. The second story of each of the three process buildings would include the heating, ventilating, and air conditioning (HVAC) supply fans, exhaust fans and high-efficiency particulate air (HEPA) filters, breathing/plant/instrument air compressor rooms, electrical rooms, process support equipment rooms, and miscellaneous support space. The buildings would be connected by secure transfer corridors.

Support buildings within the PIDAS. The major support structures located within the PIDAS would include an Analytical Support Building and a Production Support Building. The Analytical Support Building would contain the laboratory equipment and instrumentation required to provide analytical chemistry and metallurgical support for the CPC processes, including radiological analyses. The Production Support Building would provide the capability for performing classified work related to the development, testing, staging and troubleshooting of CPC processes and equipment. A number of other smaller structures also supporting a CPC would include standby generator buildings, fuel and liquid gas storage tanks, an HVAC chiller building, cooling towers, and an HVAC exhaust stack.

Support buildings outside the PIDAS. The major structures located outside the PIDAS would include an Engineering Support Building, a Commodities Warehouse, and a Waste Staging/TRU Packaging Building. This Waste Staging/TRU Packaging Building would be used for characterizing and certifying TRU waste prior to packaging and short-term storage prior to shipment to the waste disposal facility. Parking areas and storm water retention basins would also be located outside the PIDAS. In addition, a temporary concrete batch plant and construction laydown area would be required during construction. A generic layout showing the major buildings and their relationship to each other is shown in Figure 3.4.1-1. Table 3.4.1–1 shows the dimension estimates. The overall plant layout in this generic representation is a greenfield campus layout and would be adapted to each site as necessary. The actual footprint of all of the buildings, as shown in the table, should be less than the "developed" area from the generic layout. Thus, the actual developed site layout could be less than that shown in Table 3.4.1-2, and could fit any site with enough space for buildings footprint and adequate security standoff distances.

Table 3.4.1-1—Dimensions for the CPC

	Dimension
Processing Facilities Footprint (ft^2)	308,000
Support Facilities Footprint (ft^2)	280,000
Research and Development (ft^2)	57,000
Total Facilities Footprint (ft^2)	645,000
Area Developed during Construction (acres)	140
Post Construction Developed Area (acres)	110

Source: NNSA 2007.

CPC construction, operational materials and wastes. Tables 3.4.1-2 through 3.4.1-4 identify the construction and operational requirements for a CPC. As shown in Table 3.4.1-2, CPC construction requirements and wastes at LANL and SRS could be less than at all other sites because the existing plutonium infrastructure could be used. For Los Alamos, this SPEIS assumes that a CPC would not require additional construction in support of an R&D mission, as that mission currently exists at LANL. Additionally, the CMRR, a new planned facility for LANL, if built, could provide support to the CPC. For SRS, this SPEIS includes an analysis of both a stand-alone CPC and a CPC that would use the PDCF and infrastructure that are to be constructed in support of the Fissile Materials Disposition (FMD) Program (see Section 3.4.1.5 for more details). As shown in Table 3.4.1-2, NNSA has estimated that using these facilities/infrastructure could reduce construction requirements by approximately 25 percent.

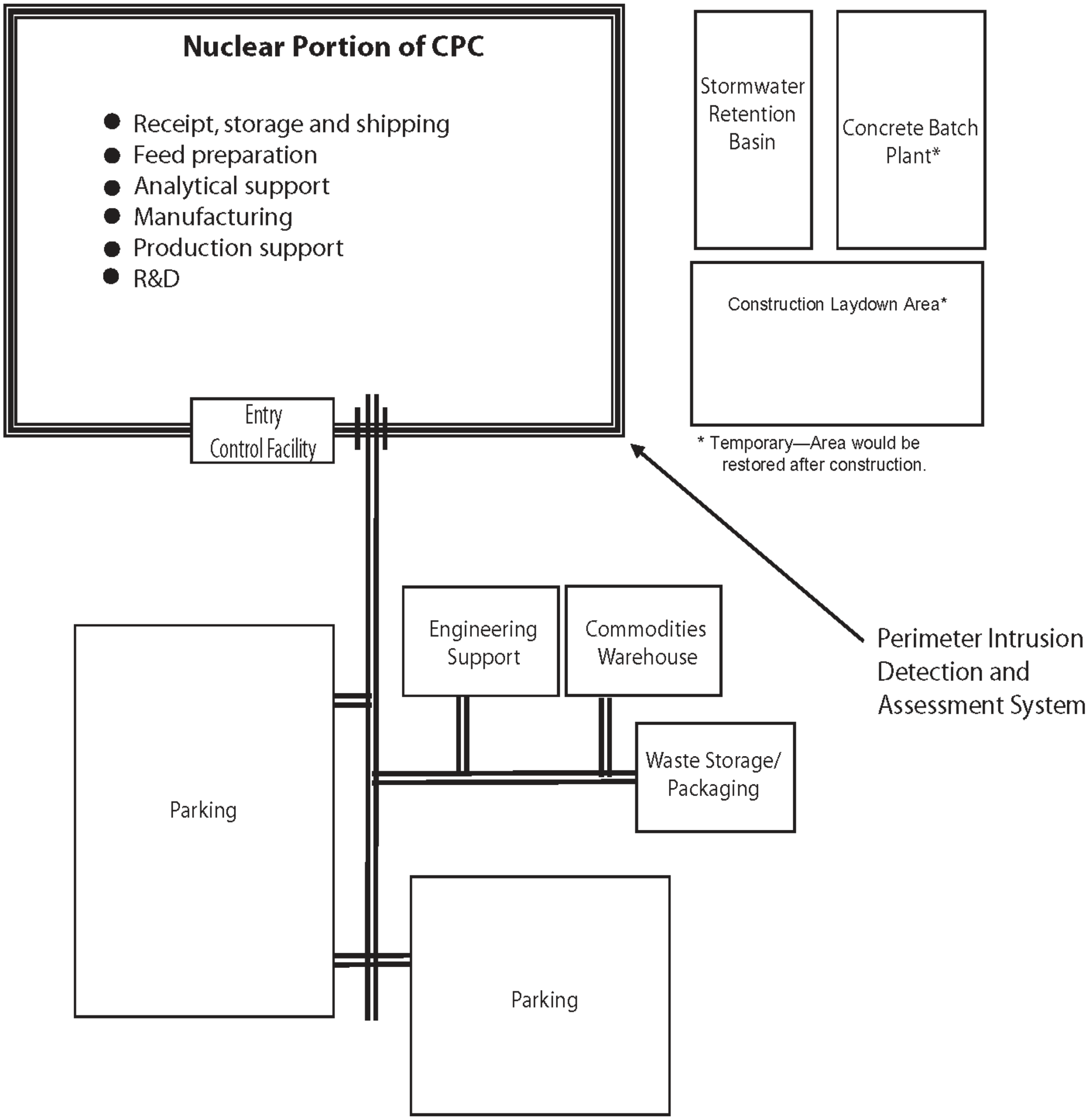


Figure 3.4.1-1—Generic Layout of a CPC

Table 3.4.1-2—CPC Construction Requirements

Requirement	Stand-alone CPC at SRS, Y-12, Pantex, NTS	CPC at Los Alamos[a]	CPC at SRS Using PDCF[a]
Electrical Energy (MWh)	13,000	12,000	12,000
Peak Electricity (MWe)	3.3	3.0	3.0
Concrete (yd^3)			
Total	308,000	280,000	280,000
Peak Yearly	107,000	97,000	97,000
Aggregate (yd^3)			
Total	288,000	262,000	262,000
Peak Yearly	79,000	72,000	72,000
Steel (tons)			
Total	44,000	40,000	40,000
Peak Yearly	11,900	10,800	10,800
Liquid Fuels (million gallons)			
Total	4.8	4.4	4.4
Peak Yearly	0.8	0.7	0.7
Gases (yd^3)			
Total	19,800	18,000	18,000
Peak Yearly	5,700	5,200	5,200
Water (million gallons)			
Total	20.9	20.9	20.9
Peak Yearly	5.6	5.6	5.6
Total Employment (Worker Years)	2900	2,650	2,650
Peak Employment (Workers)	850	770	770
Construction Period (years)	6	6	6
Hazardous Liquid Wastes (tons)	7.0	6.5	6.5
Nonhazardous Solid Wastes (yd^3)	10,900	9,800	9,800
Nonhazardous Liquid Wastes (gallons)	56,000	50,700	50,700

[a] Data in this table reflects the fact that CPC construction requirements at Los Alamos and SRS would be lower than at NTS, Pantex, and Y-12 due to the potential use of existing or planned plutonium infrastructure at those two sites.
Source: NNSA 2007

Table 3.4.1-3—CPC Operations Annual Requirements

Resources	CPC at LANL [200 pits per year (ppy) (surge)] [f]	CPC at SRS, Y-12, Pantex, NTS [200 ppy (surge) plus R&D]
Electrical Consumption[a] (MWh)	48,000	48,000
Peak Electrical (MWe)	11.0	11.0
Diesel Fuel[b] (gallons)	21,000	23,000
Nitrogen[c] (yd^3)	81,000	89,000
Argon[c] (yd^3)	2,000	2,200
Domestic Water[d] (gallons)	14,000,000	15,500,000
Cooling Tower Make-up (gallons)	66,000,000	73,000,000
Steam[e] (million pounds)	227	250
Total workers	1,170	1,780
Radiation workers	675	1,150

[a] Electrical: Based on 24 hrs/day, 365 days/yr.
[b] Diesel Fuel: Based on diesel generator testing 1 hr/week.
[c] Nitrogen and Argon: Annual consumption is based on 1 percent make-up.
[d] Domestic Water: Calculations for the annual consumption were based on 189 L/day/person, 240 days/year.
[e] Steam would require an energy source for generation. If coal were used, it would require 4,000 tons/yr. If natural gas were used, it would require 5,500,000 yd^3/yr.
[f] Los Alamos operational requirements for a CPC are less than the other four sites due to the fact that the plutonium R&D activities are part of the existing No Action Alternative at Los Alamos.
Source: NNSA 2007.

Table 3.4.1-4—CPC Operations Annual Waste Volumes

Annual Operating Waste Type	CPC at Los Alamos [200 ppy (surge)] [a]	CPC at SRS, Y-12, Pantex, NTS [200 ppy (surge) plus R&D]
TRU Solid (including Mixed TRU) (yd^3)	850	950
Mixed TRU Solid (included in TRU solid above) (yd^3)	310	340
LLW Solid (yd^3)	3,500	3,900
Mixed LLW Solid (yd^3)	2.3	2.5
Mixed LLW Liquid (yd^3)	0.4	0.4
Hazardous Solid (tons)	3.6	4.0
Hazardous Liquid (tons)	0.5	0.6
Nonhazardous Solid (yd^3)	7,400	8,100
Nonhazardous Liquid (gallons)	69,500	75,000

[a] Los Alamos operational wastes are less than the other four sites due to the fact that the plutonium R&D activities are part of the existing No Action Alternative at Los Alamos.
Source: NNSA 2007.

3.4.1.3 *CPC Transportation Requirements*

A CPC would require transportation activities as described in this section. Plutonium pit assemblies used as material feedstock would be shipped from Pantex to the CPC. EU parts would be disassembled from the pit assemblies and shipped to Y-12. Y-12 would recondition these parts and they would then be returned to the CPC, where they would be assembled with the plutonium components to produce weapons-ready pits for shipment to Pantex. During startup, and potentially at other infrequent times, additional plutonium metal could be required. This additional plutonium could be shipped to the CPC from SRS. Additionally, as discussed in Section 3.4.1.4, once a CPC becomes operational, Los Alamos would transfer its Category I/II SNM to the CPC if Los Alamos were not selected as the CPC site.

Both TRU waste and LLW would be generated at a CPC. DOE's Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico, would be the destination for TRU waste from all CPC alternative sites. Three candidate sites (LANL, NTS, and SRS) have LLW disposal facilities and would dispose of LLW on-site. Although Y-12 has some LLW disposal capability, it currently ships its LLW to NTS for disposal. Pantex does not have any LLW disposal capacity and would have to ship LLW to the NTS, if Pantex were selected as the CPC site. A matrix depicting the origins, destinations, and materials shipped is provided in Table 3.4.1-5.

Table 3.4.1-5—Origins, Destinations, and Material Shipped to Support the CPC

Shipment Type	CPC at SRS	CPC at Pantex	CPC at Los Alamos	CPC at NTS	CPC at Y-12
Los Alamos Plutonium into CPC	LANL ⇒ SRS	LANL ⇒ Pantex	LANL ⇒ Los Alamos (intra-site transfer)	LANL ⇒ NTS	LANL ⇒ Y-12
Existing Pits from Pantex into CPC	Pantex ⇒ SRS	None	Pantex ⇒ Los Alamos	Pantex ⇒ NTS	Pantex ⇒ Y-12
EU from Y-12 into CPC	Y-12 ⇒ SRS	Y-12 ⇒ Pantex	Y-12 ⇒ Los Alamos	Y-12 ⇒ NTS	None
EU from CPC to Y-12	SRS ⇒ Y-12	Pantex ⇒ Y-12	Los Alamos ⇒ Y-12	NTS ⇒ Y-12	None
Pits from CPC to Pantex	SRS ⇒ Pantex	None	Los Alamos ⇒ Pantex	NTS ⇒ Pantex	Y-12 ⇒ Pantex
TRU waste out of CPC to WIPP	SRS ⇒ WIPP	Pantex ⇒ WIPP	Los Alamos ⇒ WIPP	NTS ⇒ WIPP	Y-12 ⇒ WIPP
LLW out of CPC	Onsite disposal	Pantex ⇒ NTS	Onsite disposal	Onsite disposal	Y-12 ⇒ NTS

3.4.1.4 *Phaseout NNSA Plutonium Operations and Remove Category I/II SNM from LANL*

If Los Alamos is not selected as a site for a CPC, NNSA proposes to phase-out plutonium operations and remove Category I/II SNM from Los Alamos by approximately 2022. Although the exact quantities of Category I/II SNM are classified, NNSA's Category I/II SNM at Los Alamos can be divided up into three basic categories: (1) programmatic material essential to NNSA; (2) surplus material not needed by NNSA; and (3) excess material with no certain future disposition plan.

Programmatic material. Category I/II inventories of nuclear material essential to the weapons program would be transferred to the eventual CPC or CNPC. This would involve four shipments of material. Shipments to the candidate sites (NTS, Pantex, SRS, and Y-12) were modeled and analyzed.

Surplus material. Surplus materials held at LANL would be assigned to the Fissile Material Disposition (FMD) Program. This material may be sent to SRS. In 2007, DOE prepared a Supplement Analysis (SA), which determined that the potential environmental impacts associated with the consolidation at SRS of surplus, non-pit, weapons-usable plutonium from Hanford, LLNL and LANL would not be a significant change from the potential environmental impacts associated with the alternatives analyzed in previous NEPA analyses (DOE 2007b). As a result, DOE decided to consolidate storage of surplus, non-pit, weapons-usable plutonium from

Hanford, LLNL, and LANL to SRS, pending disposition (72 FR 51807). Nonetheless, for completeness, this SPEIS includes an analysis of the transportation impact associated with disposition of all surplus plutonium from LANL to SRS. Another proposal, which is not addressed by the SA, is to transport surplus HEU to Y-12. This SPEIS assesses these impacts.

Excess material. Two scenarios have been analyzed for transporting materials at LANL designated as excess: (1) shipping excess HEU to Y-12 and excess plutonium to SRS; and (2) shipping all excess materials to SRS.

This SPEIS assesses the environmental impacts associated with:

- Packaging and unpackaging Category I/II SNM
- Transporting Category I/II SNM from LANL to receiver sites
- Phasing out Category I/II SNM operations from LANL

Table 3.4.1-6—Phaseout of NNSA Plutonium Operations at LANL

Socioeconomics	610 jobs could be affected 483 jobs would be radiation workers.
Wastes	LLW: decrease by 990 yd^3 annually. MLLW: decrease by 20 yd^3 annually TRU: decrease by 690 yd^3 annually.
Radiation Dose to Workers	Dose to workers would decrease by 90 person-rem.
50-mile Population Dose	TA-55 contributes 0.19 person-rem/yr to dose.
Air Emissions	TA-55 emits approximately 0.00082 Curies of plutonium annually.

Source: NNSA 2007.

3.4.1.5 *Candidate Sites for a CPC*

Figures 3.4.1-2 thru 3.4.1-6 identify the reference locations for a CPC at the five candidate sites. Reference locations were identified at each site, consistent with the environmental analysis in this SPEIS, to evaluate the potential environmental impacts of a CPC. These reference locations were designated by the site offices so as to not conflict or interfere with existing or planned operations. The characterization of the affected environment in Chapter 4 of this SPEIS addresses the entire candidate site and the affected region surrounding the site. Each region varies by resource, but generally extends to a 50-mile radius from the center of each site.

Two of the sites under consideration for pit production function (Los Alamos and SRS) have existing and/or planned facilities that could be used to support production activities. The facilities could influence the location of any new facilities. This SPEIS analyzes options that would use these facilities. Section 3.4.1.6 discusses the Los Alamos option. The SRS option is discussed below.

At SRS, the reference location was selected to provide proximity to the PDCF. This location would support either a greenfield CPC or use of the infrastructure associated with the PDCF. The project scope for the PDCF includes the following capabilities and modules: pit receipt, storage, and preparation; pit disassembly; plutonium recovery and oxide conversion; tritium capture and recovery or disposal; oxide blending and sampling; non-destructive assay; product canning and storage; product inspection and sampling for international inspection; product shipping; declassification of parts not made from special nuclear materials; HEU decontamination, oxide conversion, packaging, storage and shipping; and waste packaging, sampling and certification. Support areas within the main building include: an analytical laboratory; mechanical equipment rooms; maintenance shops; ventilation exhaust rooms; waste storage; truck bay; and office areas. The following functions could likely be shared between a CPC and the PDCF: pit receipt, storage, and preparation; pit disassembly; some portions of plutonium recovery and oxide conversion; analytical laboratory; packaging, storage, and shipping; and waste management packaging, sampling and certification. For all practical purposes, the shared functions could be consolidated if these were not separated facilities. The PDCF capability is sized for a higher capacity than the CPC capability. Combining shared functions of the PDCF and the CPC could yield a floor space savings of approximately 27,000 square feet of hardened floor space; thus, a smaller CPC could be built at SRS (NNSA 2007).

3.4.1.6 *Los Alamos CPC Alternatives*

For purposes of assessing a CPC at Los Alamos, this SPEIS evaluates three approaches: (1) a greenfield CPC alternative (previously discussed in Section 3.4.1), in which new nuclear facilities would be constructed; (2) an upgraded alternative in which existing and planned facilities at Los Alamos are upgraded and augmented with new facilities to achieve a baseline of 125 pits per year for single shift operations (Upgrade Alternative); and (3) an upgrade of existing and planned facilities that would provide up to 80 pits per year (50/80 Alternative[19]). These latter two approaches are described in this section.

[19] The name "50/80 Alternative" reflects the fact that this alternative would expand pit production capacity up to 80 pits per year.

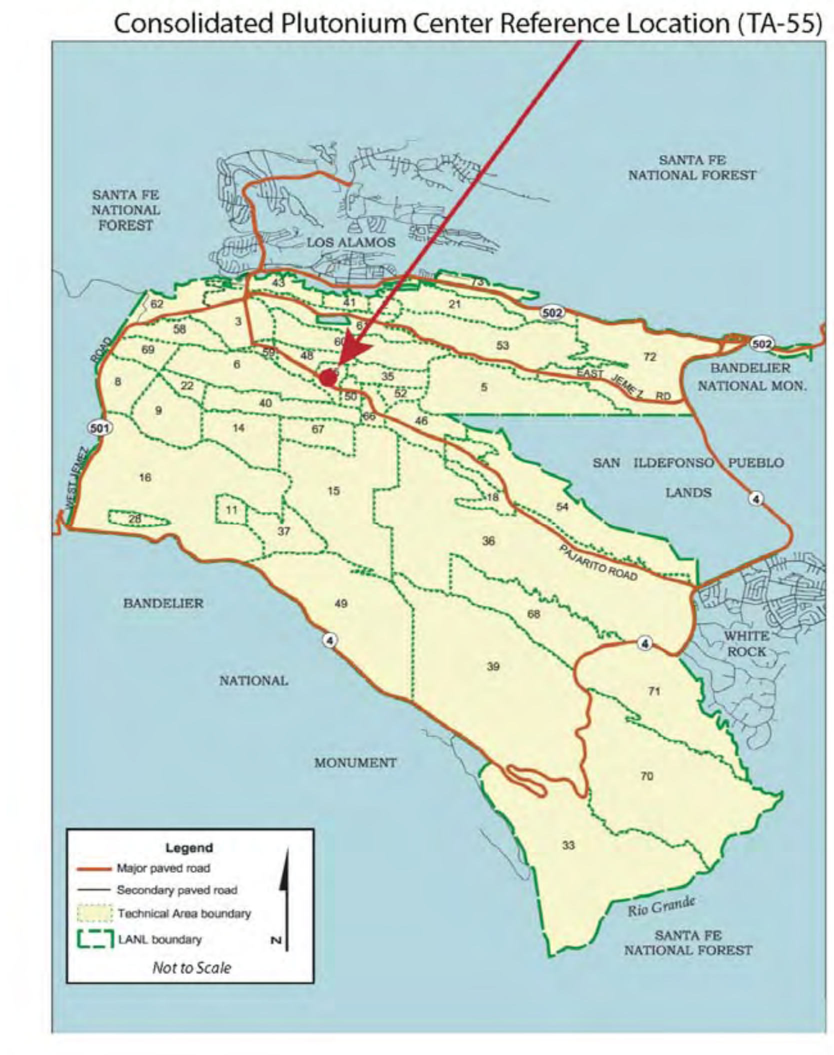


Figure 3.4.1-2—Los Alamos CPC Reference Location

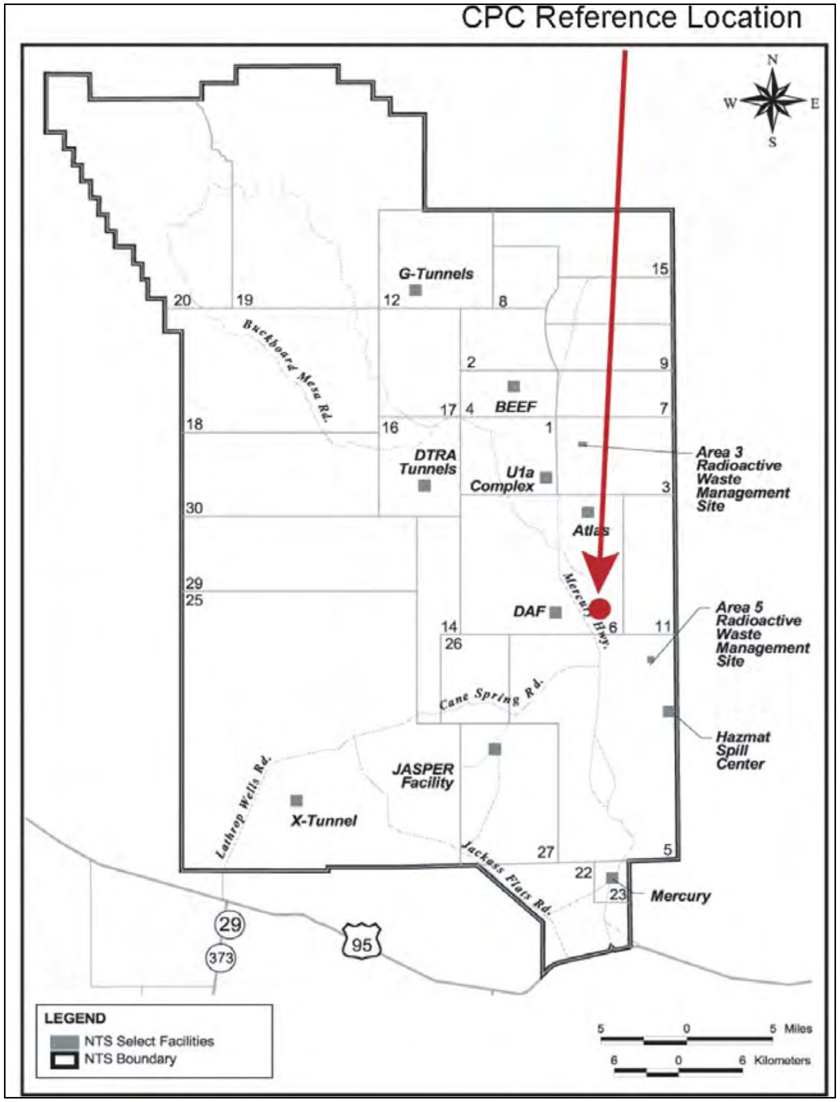


Figure 3.4.1-3—NTS CPC Reference Location

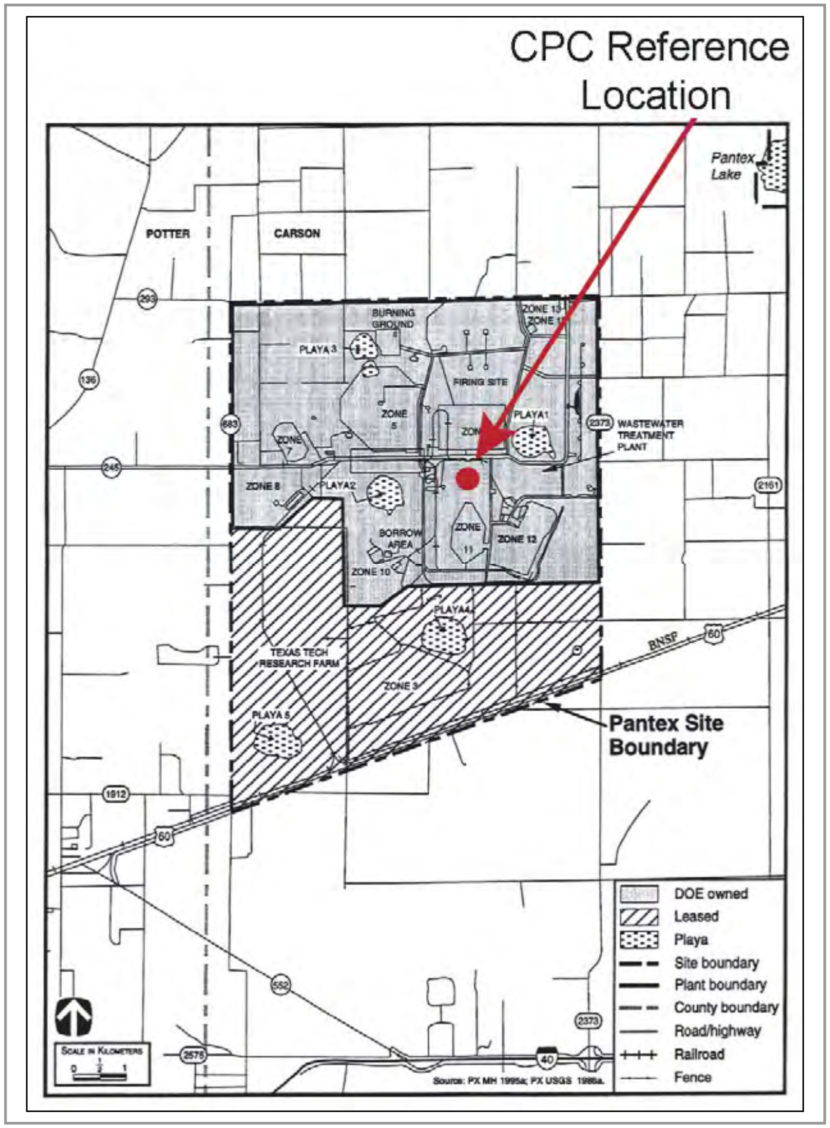


Figure 3.4.1-4—Pantex CPC Reference Location

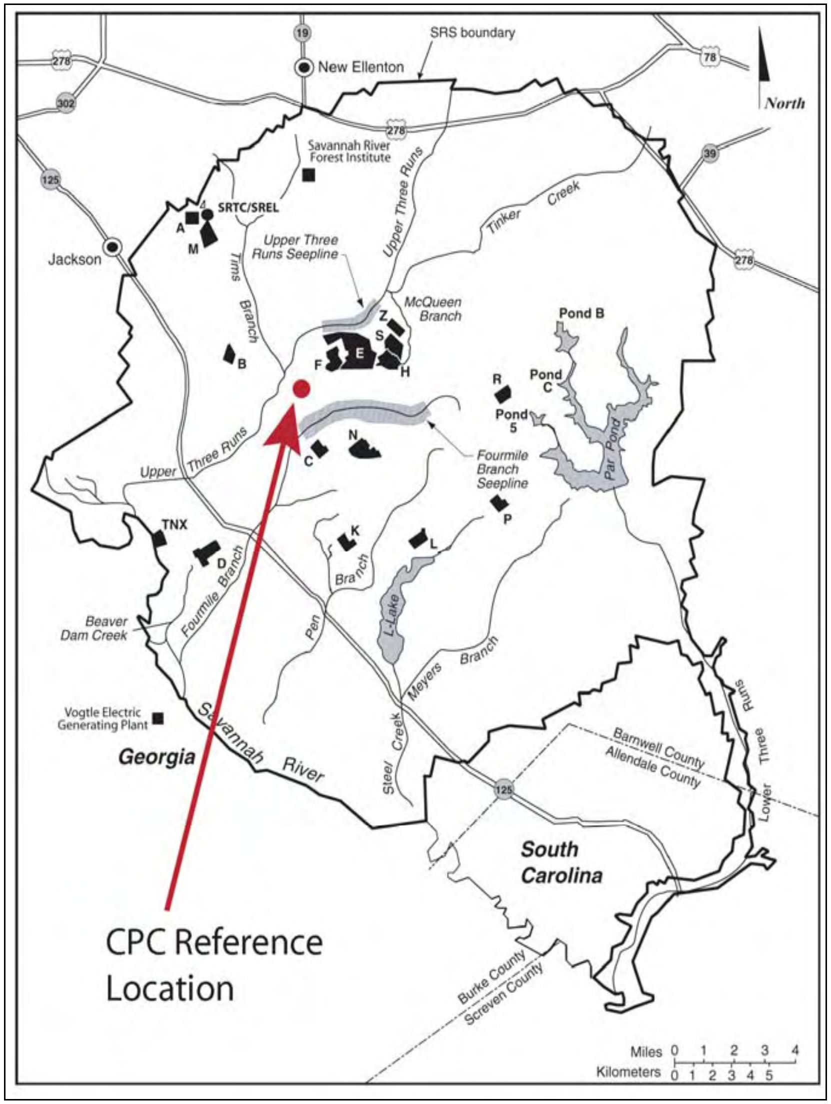


Figure 3.4.1-5—SRS CPC Reference Location

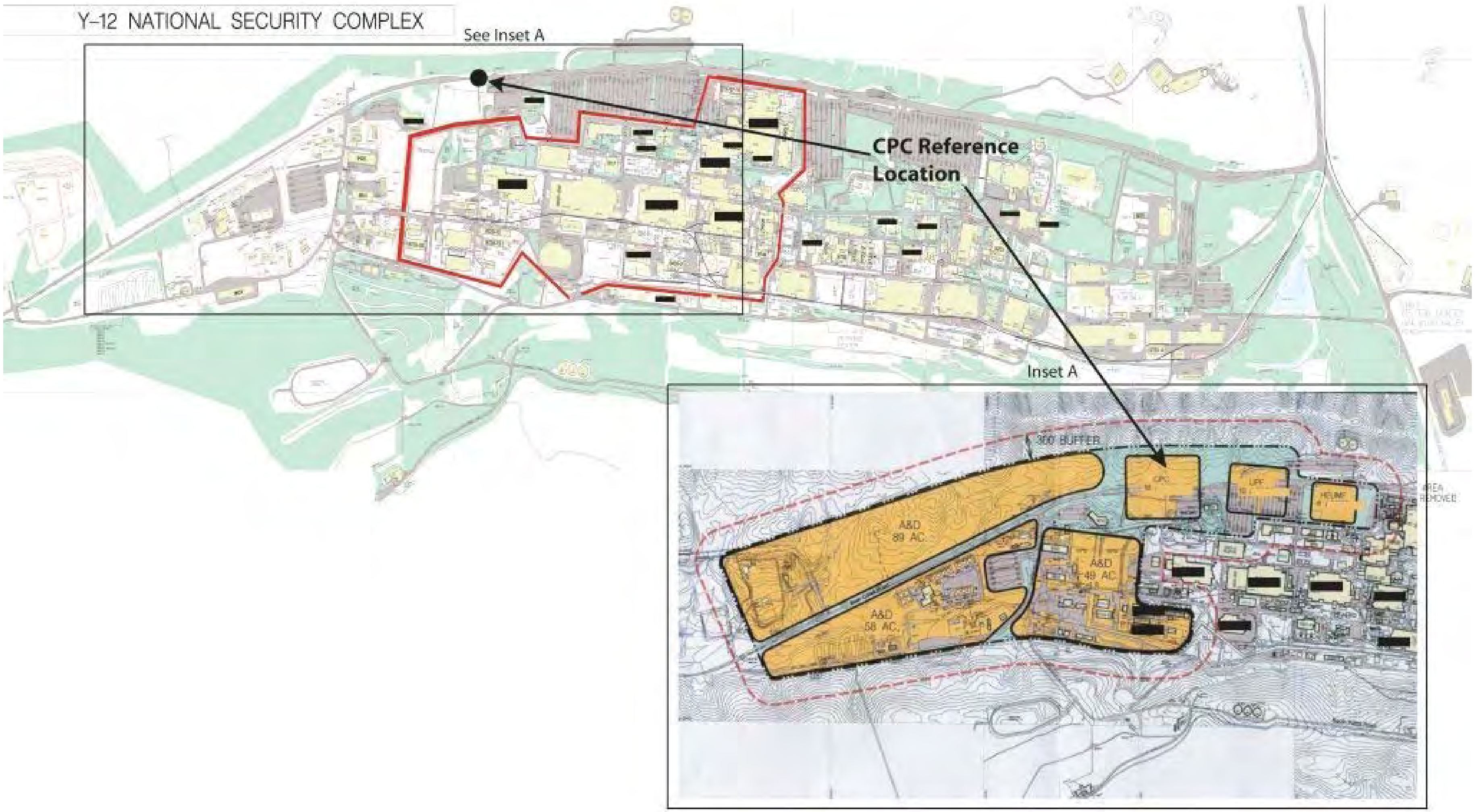


Figure 3.4.1-6—Y-12 CPC Reference Location

3.4.1.6.1 Los Alamos Upgrade Alternative

Los Alamos could support pit production requirements using existing and new facilities at TA-55, which is the current site of the Plutonium Facility (PF-4) and future site of the Chemistry and Metallurgy Research Building Replacement (CMRR) Facility. The programmatic operations at TA-55 are supported by several facilities, all of which are included in the No Action Alternative, including:

- The Radioactive Liquid Waste Treatment Facility (RLWTF);
- The solid waste characterization and disposal site (TA-54);
- The Chemistry and Metallurgy Research (CMR) Building (TA-03-29);
- The Sigma Building (TA-03-66); and
- The Radiochemistry Facility (TA-48, RC-1).

In addition, previously planned facilities that would support plutonium operations include:

- The CMRR Facility;
- A new radiography facility; and
- A new solid-waste staging facility.

Estimated modifications to support the Los Alamos Upgrade Alternative. Using the existing TA-55, the pit production capacity could be enhanced from the current capacity to approximately 125 pits per year for single shift operations by the following:

1. Expanding the scope and the size of the planned CMRR Facility; and/or
2. Constructing a new facility (known as the "Manufacturing Annex") to augment existing pit-manufacturing capacity, the planned CMRR Facility, and related infrastructure capacity.

Both approaches would result in the addition of up to 400,000 square feet of space at TA-55, either as one or more stand-alone facilities (e.g., the Manufacturing Annex, which would be comprised of a Manufacturing Annex Nuclear Facility and a light laboratory/utility/office building [LLUOB])) or as an addition to the CMRR. As such, the environmental impacts are not expected to differ significantly. This SPEIS analyzes the environmental impacts of the addition of a Manufacturing Annex to provide the additional pit manufacturing, supply/recovery, and/or analytical chemistry support.

Based on prior planning information (NNSA 2007), the new Manufacturing Annex would be approximately the same size as the buildings in the current CMRR project (which would consist of the Chemistry and Metallurgy Research Replacement Nuclear Facility and a radiological laboratory/utility/office building [RLUOB]). This annex would be located near the existing PF-4 structure to minimize the logistics of material and personnel movements between the facilities, which would take place through hardened tunnels. An overhead conceptual view of this configuration is shown in Figure 3.4.1-7.

RLUOB=Radiological Laboratory/Utility/Office Building
CMRR NF=Chemistry and Metallurgy Research Replacement Nuclear Facility
LLUOB=Light Laboratory/Utility/Office Building

Figure 3.4.1-7—TA-55 site plan showing the Proposed CMRR and Manufacturing Annex Facilities

The impacts of construction requirements of the Manufacturing Annex would be approximately the same as those for the CMRR project with selected additions to accommodate possible remodeling of PF-4. These data are shown in Table 3.4.1-7. The Los Alamos Upgrade Alternative would be expected to operate similar to the greenfield CPC at Los Alamos. As such, the operational data in Tables 3.4.1-3 and 3.4.1-4 would be applicable to this alternative.

Table 3.4.1-7—Construction Requirements for the Los Alamos Upgrade Alternative

Requirements	Consumption/Use
Peak Electrical energy (MWe)	2.0
Diesel Generators (Yes or No)	Yes
Concrete (yd^3)	3,715
Steel (tons)	401
Water (gal)	2,111,800
Land (acre)	
Laydown Area Size	2
Parking Lots	5
Total Square Footage (ft^2)	400,000
Post-Construction Footprint	6.5
Employment	
Total employment (worker years)	1,100
Peak employment (workers)	300
Construction period (years)	3.6
Waste Generated	
Transuranic Waste Contact Handled (yd^3)	200
Low level (yd^3)	200
Nonhazardous (Sanitary and Other) tons	578

Source: NNSA 2007.

3.4.1.6.2 Los Alamos Upgrade Alternative to Produce Up to 80 Pits per Year ("50/80 Alternative")

The 50/80 Alternative is evaluated to allow NNSA to consider an alternative with a pit production capacity of less than 125 pits per year. Minor internal modifications to Building PF-4 and completion of the CMRR Facility would be needed to support production of up to 80 pits per year.[20] Within TA-55/PF-4, NNSA would remodel existing space, consolidate some missions where space is not being fully utilized, and perhaps move some activities to locations where similar activities are conducted. For the period evaluated in this SPEIS, it is assumed that the Plutonium-238 mission would remain within TA-55 and PF-4.

The 50/80 Alternative is evaluated to identify impacts from reductions in pit production needs. PF-4 at TA-55 is the only existing plutonium facility capable of being upgraded to support this level of pit production (50/80 pits per year) without major construction. Implementation of the 50/80 Alternative (if selected) would be timed to minimize disruption of LANL's interim small-scale pit production activities, which are needed to meet current requirements.

The 50/80 Alternative differs from a greenfield CPC in several important aspects. First, this alternative assumes that NNSA would produce up to 80 pits per year; a CPC would produce 125 pits per year for single shift operations and is assessed at a bounding rate of 200 pits per year multiple shifts and extended work weeks. Next, the upgraded facility may not have a design life of 50 years (the design life for a CPC) without additional upgrades because the existing facility would have already operated for 40 years by approximately 2022.

Modifications would include major upgrades to the residue recovery/metal feed facilities in the 400 Area of PF-4. Many of the gloveboxes in this part of the facility would have to be replaced. Replacement of these older gloveboxes would be required to ensure that the recovery/feed process operations are adequate to supply plutonium metal to the manufacturing operations. There would also be significant glovebox decontamination, decommissioning, and disposal operations as new process development and certification operations are moved into other areas of PF-4. In addition, various manufacturing equipment would be added or replaced in the fabrication areas of PF-4 to increase capacity and reliability. Other upgrades at TA-55 would include heating, ventilation, and air conditioning systems; PF-4 roof replacement; confinement doors in PF-4; criticality alarm system; fire sprinkler piping; fire alarm system; replacement of cooling towers; seismic upgrades; and others.

The 50/80 Alternative includes completing the previously analyzed CMRR facility. The construction of CMRR would disturb 6.5 acres during construction and add approximately 2.5 acres to the permanent TA-55 footprint.

The Radioactive Liquid Waste Treatment Facility (TA-50) and the Solid Waste Management Facility (TA-54) would be capable of processing waste streams even with an enhanced

[20] In the Draft SPEIS, a 9,000 square feet addition to the CMRR was assessed as a means to support consolidation of plutonium operations from LLNL, provide increased analytical chemistry support for increased pit production capacity, and ensure sufficient nuclear space as a contingency. Subsequent to that assessment, NNSA concluded that the 9,000 additional square feet is unnecessary to support the consolidation of plutonium activities. Therefore, NNSA is no longer considering an addition of 9,000 square feet to the CMRR.

fabrication mission of 80 pits per year. Tables 3.4.1-8 through 3.4.1-10 list the construction and operational material requirements and waste volumes for the 50/80 Alternative.

Table 3.4.1-8—Los Alamos 50/80 Alternative Construction Requirements

Requirement	Consumption/Use
Electrical Energy (MW-hr)	1.0
Concrete (yd^3)	32,750
Aggregate (yd^3)	In Concrete
Steel (tons) including rebar	3,850
Gases (yd^3)	4,000
Water (gal)	550,000
Employment	
Total (Worker Years)	430
Peak (Workers)	190
Radiation Workers	0
Construction Period (yrs)	4

Source: NNSA 2007.

Table 3.4.1-9—Los Alamos 50/80 Alternative Annual Operating Requirements

Requirement	Consumption/Use
Electrical Energy (MW-hr)	44,000
Peak Electricity (MWe)	10
Domestic Water (gal)	10,000,000 + 33,000,000 (cooling water)
Employment	
Total Workers	680
Radiation Workers	458

Source: NNSA 2007.

Table 3.4.1-10—Los Alamos 50/80 Alternative Waste Volumes

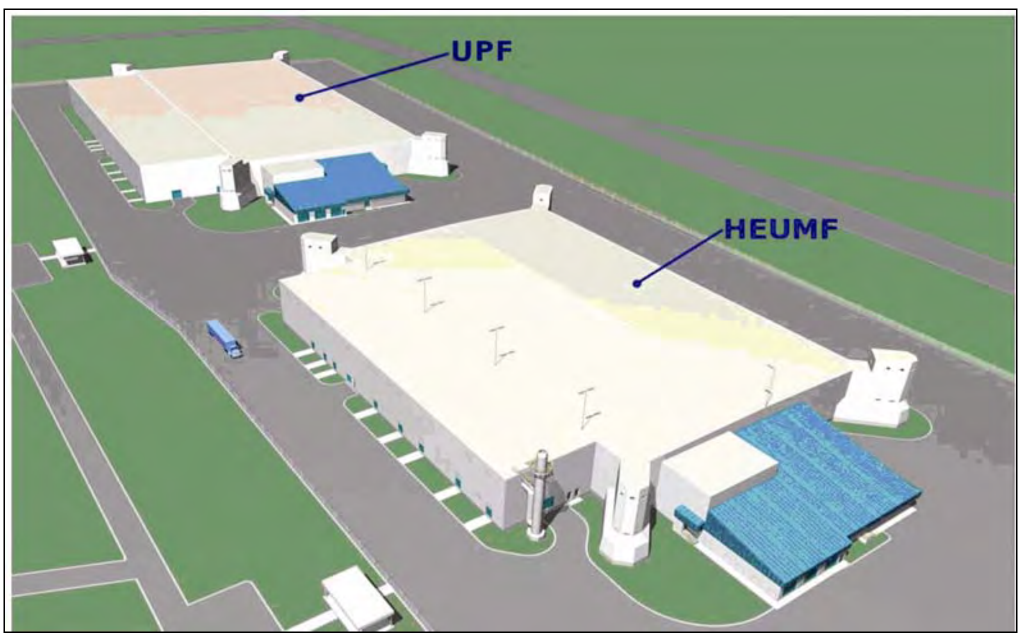
Waste	Annual Operating	Construction
TRU Waste		
Solid (includes Mixed TRU Solid) (yd^3)	575[a]	0
Liquid (yd^3)	6.5	0
Mixed TRU Waste		
Solid (included in TRU Solid) (yd^3)	2.6	0
Liquid	0	0
LLW		
Solid (yd^3)	1850	0
Liquid (yd^3)	19.5	0
Mixed LLW		
Solid (yd^3)	65	0
Liquid (yd^3)	0	0
Hazardous		
Solid (tons)	265	0
Liquid (tons)	2.6	4
Nonhazardous		
Solid (yd^3)	700	9,750
Liquid (gallons)	16,000	7,800

Source: NNSA 2007.
[a] Includes 75 yd^3/yr over a 10-year period to replace gloveboxes in PF-4.

3.4.2 Uranium Processing Facility at Y-12

As discussed in Section 3.2.9, Y-12 manufactures nuclear weapons secondaries, cases, and other weapons components; evaluates and performs testing of these weapon components; maintains Category I/II quantities of HEU; conducts dismantlement, storage, and disposition of nuclear weapons materials; and supplies HEU for use in naval reactors. The UPF would consolidate many of these operations into an integrated manufacturing operation sized to satisfy all identified programmatic needs. The UPF would be sited adjacent to the Highly Enriched Uranium Materials Facility (HEUMF), which recently completed construction, to allow the two facilities to function as an integrated operation. A site-wide EIS for Y-12 is currently being prepared and is assessing alternatives, including a UPF at Y-12 (70 FR 71270) (see Section 1.5.2.2). Transition of Y-12 operations to this configuration would enable the high security area to be reduced by 90 percent. As described below, would significantly improve physical protection; optimize material accountability; enhance worker, public, and environmental protections; and reduce operational costs.

The proposed UPF would replace multiple existing enriched uranium (EU) and other processing facilities. The current operating and support areas occupy approximately 633,000 square feet in multiple buildings, while a UPF would result in approximately a 33 percent reduction, to approximately 400,000 square feet in one building. Once a UPF were operational, some existing facilities would be available for decontamination and decommissioning (D&D), while other facilities could be used for non-EU processes. Figure 3.4.2-1 shows an artist's rendering of the proposed UPF. Figure 3.4.2-2 shows the location of a UPF relative to other buildings at Y-12.



Source: NNSA 2005c.

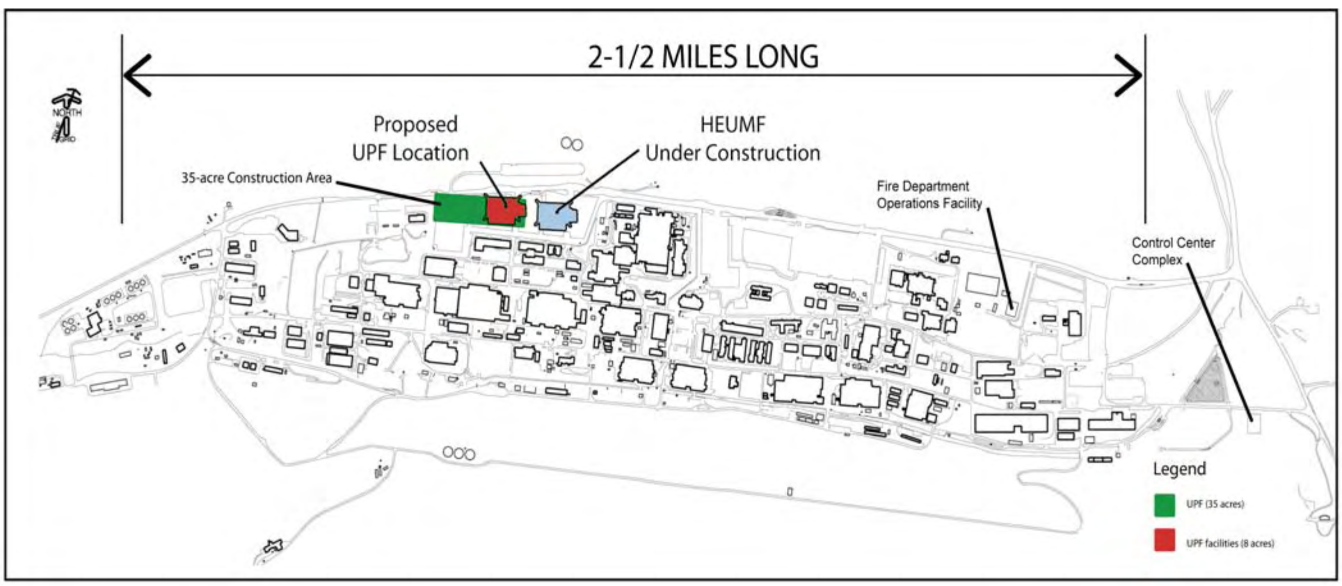
Figure 3.4.2-1—Artist's Rendering of a UPF Adjacent to the HEUMF

3.4.2.1 *UPF Construction*

The new structures and support facilities that would constitute a UPF complex include:

- UPF building;
- UPF electrical switching center;
- chiller building and chiller building switch center;
- cooling tower;
- aboveground water tank for a seismic-qualified firewater system with a firewater pumping facility;
- electrical generators; and
- modified PIDAS to encompass the UPF complex.

The design life of a UPF would be 50 years. It would be equipped with safety support systems to protect workers, the public, and the environment, and would be housed in a multistory, reinforced concrete building designed for safety and security. The main building would be a concrete structure with reinforced exterior walls, floor slabs, and roof. The preliminary schedule for the project calls for site preparation beginning in approximately 2010, with completion by approximately 2016, and operations beginning by approximately 2018. As shown on Figure 3.4.2-2, construction of a UPF would require approximately 35 acres of land, which includes land for a construction laydown area and temporary parking. Once constructed, the UPF facilities would occupy approximately 8 acres.



Source: NNSA 2007.

Figure 3.4.2-2—Proposed Location of a UPF at Y-12

Table 3.4.2-1 lists the construction material requirements and wastes for a UPF.

Table 3.4.2-1—UPF (based on a HEUMF) Construction Requirements and Estimated Waste Volumes

Requirements	Consumption
Materials/Resource	
Peak Electrical energy (MWe)	2.2
Concrete (yd^3)	200,000
Steel (tons)	27,500
Liquid fuel and lube oil (gallons)	250,000
Water (gal)	4,000,000
Aggregate (yd^3)	5,000
Land (acres)	35
Employment	
Total employment (worker years)	2,900
Peak employment (workers)	900
Construction period (years)	*6*
Waste Generated	
Low-level Waste	
Liquid (gallons)	0
Solid (yd^3)	70
Hazardous (tons)	4
Nonhazardous (Sanitary) (tons)	800

Source: BWXT 2006a.

3.4.2.2 *UPF Operations*

The core operations of a new UPF would be assembly, disassembly, quality evaluation, specialized chemical and metallurgical operations of EU processing, and product certification and inspection. The material processing areas within a UPF would use gloveboxes, inert atmosphere, negative air pressure, and other engineered controls, supported by administrative controls, to protect workers and the public from exposure to radiological and hazardous materials. Exhaust emissions for the facility would comply with applicable Federal and state requirements. In conjunction with other engineered containment measures, the ventilation system barriers would provide a layered system of protection.

Other systems in a UPF for facility operation and Environment, Safety and Health (ES&H) protection include:

- Criticality Accident Alarm System
- Emergency Notification System
- Alarm System
- Fire Suppression Alarm Systems
- Telephone and public address system
- Classified and unclassified computer network
- Personnel Monitoring System
- Security-related sensors
- Automated inventory system with continuous real-time monitoring

Table 3.4.2-2 lists the operations requirements the UPF.

Table 3.4.2-2—UPF Annual Operation Requirements and Estimated Waste Volumes

Requirements	Consumption
Materials/Resource	
Electrical energy (MWh/yr)	168,000
Peak electrical demand (MWe)	18.4
Natural gas (yd^3)	894,000
Water (gallons)	105,000,000
Plant footprint (acres)	8
Employment	
Total Workers	600
Radiation Workers	315
Waste Generated	
Low-level	
Liquid (gallons)	3,515
Solid (yd^3)	7,800
Mixed Low-level	
Liquid (gallons)	3,616
Solid (yd^3)	21
Hazardous (tons)	14
Non-hazardous (Sanitary) (tons)	7,125
Non-hazardous liquid (gallons)	50,000

Source: BWXT 2006a.

3.4.3 Upgrade Existing Enriched Uranium Facilities at Y-12

NNSA could upgrade the existing EU facilities. In that case, there would be no UPF and the current high-security area would not be reduced. The upgrade projects would be internal modifications to existing facilities and would improve protection for worker health and safety and extend the life of existing facilities. If a UPF were not constructed at Y-12, major investments above and beyond normal maintenance would be required for continued operations in the existing facilities, including structural upgrades; heating, ventilating, and air conditioning (HVAC) replacements; and fire protection system replacement/upgrades (see Appendix A for a detailed discussion of the specific upgrades). The projects would improve airflow controls between clean, buffer, and contamination zones; upgrade internal electrical distribution systems; and reinforce a number of structures to comply with current natural phenomena criteria (DOE-STD-1023-95).

For the purpose of this analysis, it is assumed that the upgrades would be performed over a 10-year period following issuance of a SPEIS ROD. This would enable NNSA to spread out the capital costs associated with the upgrades, and minimize disruption of operations. Conventional construction techniques would be used for upgrade projects. Table 3.4.3-1 lists the construction requirements associated with the upgrades. In terms of operations, there would be no change from the No Action Alternative.

Table 3.4.3-1—Construction Data for Upgrading Existing Uranium Facilities

Requirements	Consumption
Materials/Resource	
Electrical energy use (MWh)	No significant change compared to current site use
Concrete (yd^{3})	No significant change compared to current site use
Steel (tons)	No significant change compared to current site use
Water (gallons/year)	4.2 million
Aggregate (yd^3)	No significant change compared to current site use
Land (Laydown Area)	<7 acres
Employment	
Total employment (worker years)	1,000
Peak employment (workers)	300
Construction period (years)	10
Wastes	
Hazardous	
Liquid (gallons)	No significant change compared to current site use
Solid (tons)	14

Note: "No change from current" represents estimated 2006 usage (see Section 4.9 for information related to current site use).
Source: BWXT 2006a.

3.5 PROGRAMMATIC ALTERNATIVE 2: CONSOLIDATED CENTERS OF EXCELLENCE

NNSA also evaluates an alternative in this SPEIS involving consolidated centers of excellence (CCE). The CCE Alternative would consolidate the three major SNM functions (plutonium, uranium, and weapon assembly/disassembly) involving Category I/II quantities of SNM into a consolidated nuclear production center (CNPC) at one site or into consolidated nuclear centers (CNC) at two sites. Depending upon the option selected, this alternative could result in the end of all nuclear weapons operations at up to two sites (e.g., Y-12 and Pantex). The program, capability, and facility requirements for the CCE alternative are described below. More details are in Appendix A.

Requirements and Assumptions

- A CCE alternative would be sized and configured to support the nuclear weapons stockpile after full implementation of the *Moscow Treaty*. The upper bound of the capacities would support delivery of 125 weapon assemblies per year to the stockpile in five-day, single-shift operations. Multiple shift operation and extended work weeks would yield up to 200 weapon assemblies per year.

- Fabrication, inspection, and assembly equipment would support the fabrication of new replacement weapons (such as RRWs), legacy weapons or a combination of both. In general, the ability to produce legacy weapons would also provide the capability to produce new replacement weapons. NNSA expects that replacement weapons such as RRWs would use fewer hazardous materials than found in most legacy weapons and require production tolerances within the range of those required for legacy weapons.

- The CCE alternative includes three major facilities: a consolidated plutonium center (CPC), consolidated uranium center (CUC), and the A/D/HE Center. As explained in Section 3.5.2, there is an option to separate the weapon A/D/HE mission to allow NNSA to consider an alternative that locates nuclear production facilities at a different site than the A/D/HE mission.

- All Category I/II SNM required by NNSA would be stored at the CCE facilities.

- CCE facilities would have a useful service life of at least 50 years without major renovation.

- CCE facilities could be located at one or more of the following sites: Los Alamos, Pantex, NTS, SRS, and Y-12.

- A modular arrangement of facilities (a campus) is assumed for the CCE options rather than separate operational wings of a single large facility under one roof. The facilities making up the CCE campus would be configured so that they can be constructed sequentially. Building a single building to house CCE functions was not considered reasonable due to the need to bring facilities on-line in sequence and the fundamental differences in uranium, plutonium, and assembly/disassembly operations.[21] The assumed schedule for the CCE facilities is shown in Table 3.5-0:

Table 3.5-0—Schedule for Consolidated Centers of Excellence Facilities:

Facility	Start Detailed Facility Design	Begin Operations
CUC	2009	2018
CPC	2012	2022
A/D/HE Center	2015	2025

- It is assumed that facilities at Y-12 and Pantex whose missions would be included in the CCE alternative would be put into brought to a safe shutdown condition as soon as possible if these sites were not selected for a CCE option.

- A CNPC or CNC would consist of a central area that includes all operations involving Category I/II quantities of SNM that would be surrounded by a PIDAS. A buffer area would provide an unobstructed view of the area surrounding the PIDAS. Support facilities requiring lower levels of security protection would be outside the PIDAS. The land requirements for operation of a CNPC and CNC are shown in Tables 3.5-1 and 3.5-2.

Table 3.5-1—Land Requirements to Operate a CNPC*

Operation (acres)	Total Area: 545*	
	PIDAS	Non-PIDAS
	Total: 235 • CPC: 40 • CUC: 15 • A/D/Pu Storage: 180	**Total: 310** • Non-SNM component production: 20 • Administrative Support: 70 • Explosives Area: 120 • Buffer Area: 100

*Total land area for CNPC at Y-12 would be reduced by approximately 27 acres due to existing uranium production facilities, including the HEUMF.

Table 3.5-2—Land Requirements to Operate a CNC*

Operation (acres)	Total Area: 195*	
	PIDAS	Non-PIDAS
	Total: 55 • CPC: 40 • CUC: 15	**Total: 140** • Non-SNM component production: 20 • Administrative Support: 70 • Buffer Area: 50

*Total land area for CNC at Y-12 would be reduced by approximately 27 acres due to existing uranium production facilities, including the HEUMF.

[21] The facilities that would constitute a CCE would be separate buildings in a campus because they have different and unique safety and operational requirements, and it would not be technically feasible to make them part of a single large facility without having separate systems for the operation of the three facilities and other physical features (blast wall separation, etc.) to keep them separate. They would be built in sequence because they are very complex facilities and the potential realities of construction logistics, cash flow, and start-up management would not support a single facility. Building them in sequence reduces the construction management risk and allows lessons learned from one to benefit the others. The CUC would be first because the existing uranium facilities at Y-12 (except the HEUMF) are very old. The CPC would be built second because the LANL facilities, with a CMRR, can handle the immediate need for pits. The weapons A/D/HE facilities would be built last because there is less programmatic urgency than for the CUC and CPC.

3.5.1 Consolidated Nuclear Production Center Option

This option would consolidate the three major SNM functions (plutonium, uranium, and A/D/HE) involving Category I/II quantities of SNM into a consolidated nuclear production center (CNPC) at one site. Depending upon the site selected for a CNPC, this option could result in the cessation of NNSA weapons operations at up to two sites (e.g., Y-12 and Pantex). Under this option, NNSA would construct and operate a CNPC, as described in Section 3.5, at SRS, Y-12, Pantex, NTS, or Los Alamos. The CNPC would combine three major facilities: CPC, CUC, and the A/D/HE Center. The description of the CPC is in Section 3.4.1 and is not repeated below. The sections below describe the other major CNPC facilities: the CUC (Section 3.5.1.1) and the A/D/HE Center (Section 3.5.1.2). In addition, Section 3.5.1.3 describes the transport of plutonium and HEU to the CNPC to support future NNSA needs. Finally, Section 3.5.1.4 discusses site-specific characteristics of the alternative sites that could affect the manner in which a CNPC might be implemented. For example, a CNPC located at Pantex would not require the construction of the A/D/HE Center, as Pantex currently performs that mission in existing facilities that would not require major renovations to continue operations for years. Section 3.5.1.4 also identifies the reference locations for the CNPC at each site alternative. A generic layout of the CNPC is shown in Figure 3.5.1-1.

3.5.1.1 *Consolidated Uranium Center*

A CUC would have a nuclear facility located within a heavily protected area (PIDAS), and non-nuclear support facilities outside the PIDAS. The nuclear facility would consist of a UPF, which is described in Section 3.4.2, and a storage facility for HEU.[22] The nuclear facility would process HEU, produce nuclear weapon secondary components, provide the capability to perform Category I/II HEU R&D in support of LANL and LLNL, and store HEU. The non-nuclear facilities would contain the non-nuclear production equipment, and support functions. The facility would also contain the chemical processes, fabrication operations, support functions associated with the production of lithium-hydride and lithium-deuteride components, and general manufacturing capabilities. For this analysis, it is assumed that a CUC could be built at any of the sites on approximately the same timeframe that a UPF could be built at Y-12. A CUC would be constructed over a six year period, beginning in approximately 2010, with completion by approximately 2016, and operations beginning by approximately 2018.

The land requirements for a CUC are shown in Table 3.5-3.

Table 3.5-3—Land Requirements for CUC*

Construction (acres)	**50**	
Operation (acres)	**Total Area: 35****	
	PIDAS	**Non-PIDAS**
	15	20

* At Y-12, a UPF would be constructed (see Section 3.4.2). The UPF would require a total of 8 acres rather than the 35 acres required for a CUC.
****** Includes a buffer area that would provide unobstructed view of the area surrounding the PIDAS.

[22] A CUC at Y-12 would not require construction of a new HEU storage facility because NNSA recently completed construction of a modern storage facility (the HEUMF) at that site.

3.5.1.1.1 CUC Construction

The construction discussion contained in Section 3.4.2 pertains to a UPF constructed at Y-12, and is relevant to a portion of a CUC that could be built at sites other than Y-12. As such, that discussion is not repeated here. This section presents the requirements for a CUC that could be built at sites other than Y-12. The major difference involves the addition of HEU storage and the non-nuclear support facilities outside the PIDAS. Construction of a CUC at sites other than Y-12 would require approximately 50 acres of land, which includes land for a construction laydown area and temporary parking. Once constructed, a CUC would occupy approximately 35 acres. Table 3.5.1-1 lists the construction requirements for a CUC, along with the associated waste volumes.

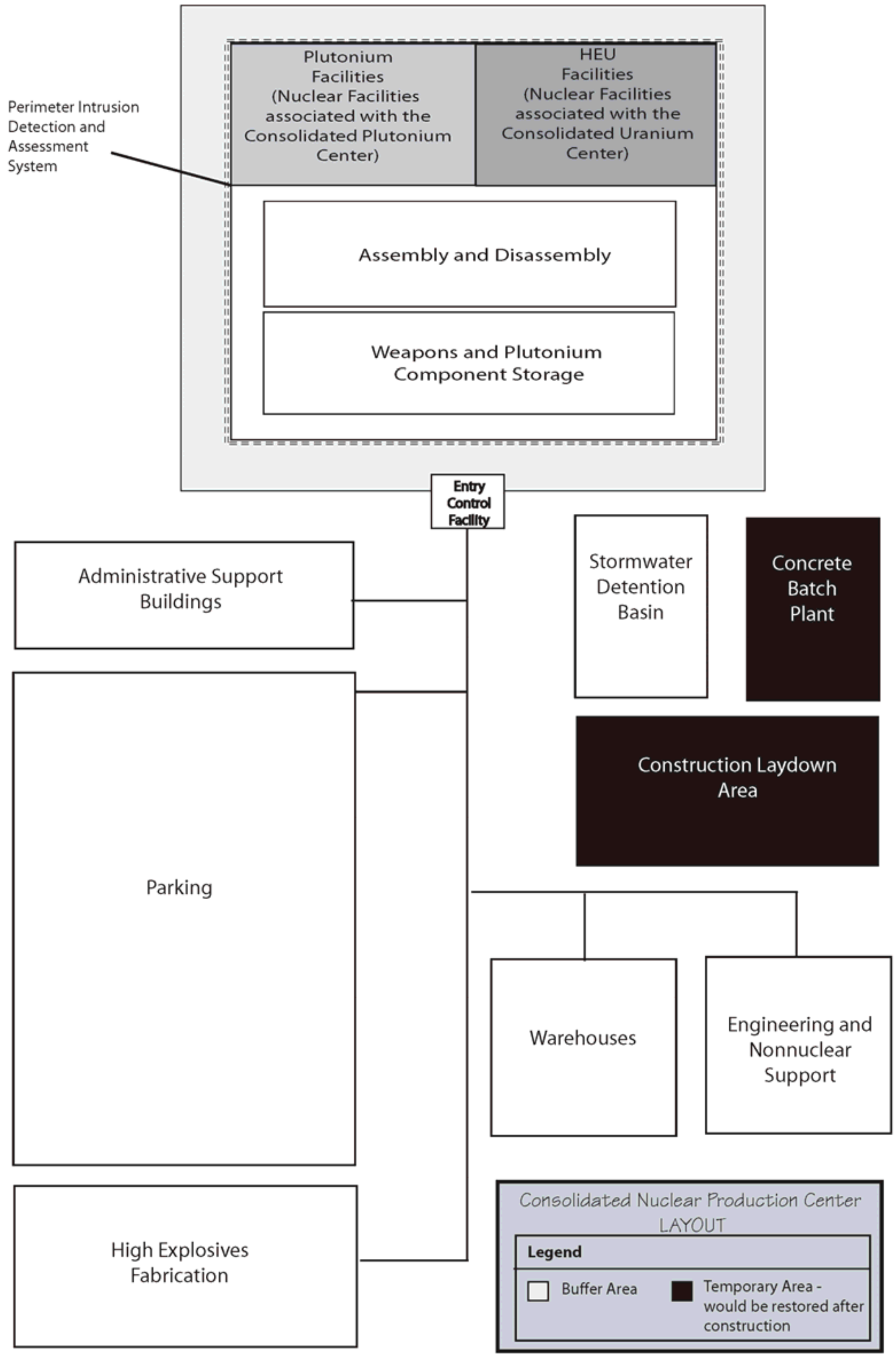


Figure 3.5.1-1—Generic Layout of the CNPC

Table 3.5.1-1—CUC Construction Requirements and Estimated Waste Volumes[23]

Requirements	Consumption
Materials/Resource	
Peak Electrical energy (MWe)	2.5
Concrete (yd^3)	230,000
Steel (tons)	29,500
Liquid fuel and lube oil (gallons)	325,000
Water (gallons)	5,200,000
Aggregate (yd^3)	6,000
Land (acre)/Laydown Area	50/22
Employment	
Total employment (worker-years)	4,000
Peak employment (workers)	1,300
Construction period (years)	6
Wastes Generated	
Low-level	
Liquid (gallons)	0
Solid (yd^3)	70
Mixed Low-level	
Liquid (gallons)	0
Solid (yd^3)	0
Hazardous (tons)	6
Nonhazardous (Sanitary) (tons)	1000

Source: NNSA 2007

The nuclear portion of a CUC would require approximately 500,000 square feet in one building. Of this, long-term storage of Category I/II HEU would account for approximately 100,000 square feet. The non-nuclear support facilities outside the PIDAS would require approximately 150,000 square feet.

3.5.1.1.2 CUC Operations

A CUC would provide secure docking for Safeguards Transporters (SGTs) to ensure the secure, transfer of secondaries and other materials containing HEU. The shipping and receiving docks at a CUC would accommodate the simultaneous loading and unloading of three SGTs. The main operational steps that would be involved in handling containers with HEU materials are presented below:

- SGT arrives at the loading dock;
- Shipping containers are offloaded and moved to the nondestructive assay (NDA) and re-containerization area;
- A transfer check is performed;
- Containers undergo NDA;
- HEU materials are placed in new containers if required;

[23] Requirements in Table 3.5.1-1 reflect a CUC consisting of both nuclear and non-nuclear facilities. At Y-12, only a UPF would be required. Section 3.4.2 identifies UPF construction requirements and estimated waste volumes for Y-12.

- Each container is entered into the computerized tracking system and is assigned a rack location;
- Each container is moved by forklift to its assigned location in the storage area; and
- Each container is connected to the automated inventory system.

The core operations of a CUC would be similar to the UPF operations described in Section 3.4.2, and are not repeated here. Table 3.5.1-2 lists the operations requirement, number of workers, and the expected waste generation for a CUC.

Table 3.5.1-2—CUC Annual Operation Requirements and Estimated Waste Volumes

Requirements	Consumption/Use
Materials/Resource	
Electrical energy (MWhr/yr)	168,000
Peak electrical demand (MWe)	18.4
Natural gas (yd^3)	894,000
Water (gallons)	105,000,000
Plant footprint (acres)	35
Employment	
Workers	935
Radiation Workers	490
Average Annual Dose	22.4 mrem/yr
Uranium Releases to Air (Curies)	0.01
Uranium Releases to Water (Curies)	0.20
NAAQS emissions (tons/yr)	71.64 ton/yr
Wastes Generated	
Low-level Waste	
Liquid (gallons)	3,515
Solid (yd^3)	8,100
Mixed Low-level	
Liquid (gallons)	3,616
Solid (yd^3)	70
Hazardous (tons)	15
Non-hazardous Solid(Sanitary) (tons)	7,500
Non-hazardous Liquid (gallons)	50,000

Source: NNSA 2007.

3.5.1.2 *Assembly/Disassembly/High Explosives Center*

The A/D/HE Center would carry out the following major missions:

- Assemble warheads;
- Dismantle weapons that are surplus to the strategic stockpile and sanitize[24], store, or dispose of components from dismantled weapons;
- Develop and fabricate explosive components; and
- Conduct surveillance related to certifying weapon safety and reliability.

[24] The process of sanitization involves the obliteration and demilitarization of classified weapons parts.

An A/D/HE Center would consist of nuclear facilities located within the PIDAS, and non-nuclear facilities outside the PIDAS. The nuclear facilities would contain the cells and bays in which maintenance, modification, disassembly, and assembly operations are conducted. The facilities would be designed to mitigate the effects of the unlikely accidental detonation of the weapon's explosive components. Bays differ from cells in that bays are designed to vent an explosion to the atmosphere while protecting adjacent facilities from the blast, while cells are designed to filter the explosion products, while also protecting the adjacent facilities from the blast. Appendix A contains a more detailed description of a bay and a cell.

As shown in Table 3.5.1-3, an area of 180 acres would be provided in the PIDAS for weapons assembly and disassembly facilities, and for weapons and component storage. Located outside the PIDAS would be a buffer zone and non-nuclear facilities for HE fabrication, administrative support, and disposal of explosive materials. This area would be approximately 120 acres. An A/D/HE Center would be constructed over a six-year period beginning in approximately 2020, with completion by approximately 2025, and operations beginning by approximately 2025. The design service life of an A/D/HE Center would be 50 years. Table 3.5.1-4 lists the construction requirements for an A/D/HE Center, along with the associated waste values.

Table 3.5.1-3—Land Requirements for A/D/HE Center*

Construction (acres)	**300**	
Operation (acres)	**Total Area: 300****	
	PIDAS	**Non-PIDAS**
	Weapons A/D/Pu Storage: 180	Administrative and High Explosives Area: 120

* At NTS, an A/D/HE Center would require 200 acres, due to use of existing infrastructure.
** Includes a buffer area that would provide unobstructed view of the area surrounding the PIDAS.

Table 3.5.1-4—A/D/HE Construction Requirements

Requirements	Consumption / Use
Peak Electrical energy (MWe)	12.7
Diesel Generators (Yes/No)	Yes
Concrete (yd^3)	324,500
Steel (tons)	18,050
Liquid fuel and lube oil (gallons)	21,350,000
Water (gallons)	2,022,000
Land (acre)	300
Total Square Footage added (ft^2)	2,392,400
Employment	
Total employment (worker-years)	6,850
Peak employment (workers)	3,820
Construction period (years)	6
Wastes Generated	
Low Level Waste (yd^3)	9,900
Hazardous Waste (yd^3)	0
Non-Hazardous (Sanitary and Other) (tons)	7,100
Non-Hazardous Liquid Waste (gallons)	45,000

Source: NNSA 2007.

3.5.1.2.1 Operations Conducted at an A/D/HE Center

Assembly. Weapons assembly requires written, prescribed steps to combine separate parts to form a new weapon. Complete weapons assembly would be accomplished in the following stages:

- Physics Package assembly;
- Mechanical and Electronic Components assembly; and
- Final Package or Ultimate User Package assembly.

The physics package is a subassembly combining HE components (produced at an A/D/HE Center) and nuclear components (to be manufactured at a CPC and CUC) within a protective shell. Physics package assembly entails bonding or mating the main charge subassemblies to a nuclear pit and then inserting this subassembly into a case along with other components. Mechanical and electronic components assembly entails placing the physics package in a warhead case and then installing the components for the arming, fusing, and firing systems; the neutron generator; and the gas transfer system. The final package assembly involves installing additional components and packaging the weapon for shipment.

Dismantlement. Dismantlement consists of disassembly and disposal of weapon components. The dismantlement process begins with the arrival of the weapon at the A/D/HE Center. Disassembly would include the following activities:

- Weapons staging, including inspection and verification after receipt from DOE;
- A variety of specialty operations (e.g., X-ray examinations, leak testing, coding, packaging, painting, verification, etc.) in special purpose bays;
- Mechanical disassembly operations in bays;
- Nuclear disassembly operations in cells;
- Demilitarization and sanitization of non-nuclear weapons components, for final disposition and disposal;
- Packaging and shipping or transfer of HEU to the CUC and tritium components to the SRS;
- Packaging and shipping or transfer of pits to the CPC; and
- Segregating waste into non-hazardous, hazardous, LLW, and mixed LLW categories and appropriate storage pending disposal.

High explosives fabrication. The A/D/HE Center would manufacture the main charge HE and other small explosive components. The fabrication process for explosives involves synthesizing energetic materials (explosives) and then formulating the energetic materials with other materials as appropriate. Some of the energetic materials are manufactured at the plant, while others are procured commercially. The explosive powder is then pressed into the configurations needed and machined for use in nuclear weapons.

Surveillance. To maintain the reliability of the nation's nuclear weapons, a statistical sample of randomly selected weapons from all active systems would be annually removed from the stockpile and returned to the A/D/HE Center. The weapons are disassembled, tested, and evaluated to ensure the operability of the weapons components. Most testing is done onsite, but some tests associated with component aging are performed at other laboratories and production facilities. Some weapons are configured as Joint Test Assemblies (JTAs) and used for flight-testing. Table 3.5.1-5 lists the operations requirement for an A/D/HE Center.

Table 3.5.1-5—A/D/HE Operation Requirements and Estimated Waste Volumes

Requirements	Consumption / Use
Annual Electrical energy (MWh)	52,000
Peak Electrical energy (MWe)	11.9
Fuel Usage (gallons)	367
Other Process Gas (N, Ar, etc.)	
Water (million gallons/year)	130
Plant footprint (acres)	350
Employment (workers)	1,785
Number of Radiation Workers	400
Average annual dose (mrem)	103
Maximum annual worker dose (mrem)	750
Radionuclide emissions and effluents-nuclides and Curies	
Tritium (Ci)	1.41×10^{-12}
Total Uranium (Ci)	7.50×10^{-5}
Total Other Actinides (Ci)	2.17×10^{-15}
NAAQS emissions (tons/year)	
Oxides of Nitrogen (tons/year)	91
Carbon Monoxide (tons/year)	31
Volatile Organic Compounds (tons/year)	31
Particulate Matter (tons/year)	18
Sulfur Dioxide (tons/year)	5
Hazardous Air Pollutants and Effluents (tons/yr)	22
Chemical Use	
Liquid (gallons)	40,000
Solid (pounds)	294,000
Wastes Generated	
Low Level Waste	
Liquid (gallons)	5,410
Solid (yd^3)	40
Mixed Low-Level	
Liquid (gallons)	6.00
Solid (yd^3)	<1
Hazardous Waste	
Liquid (gallons)	5,900
Solid (yd^3)	900
Non-Hazardous (Sanitary)	
Solid (yd^3)	15,000
Non-Hazardous (Other)	
Liquid (gallons)	46,000
Solid (yd^3)	12,000

Source: NNSA 2007.

3.5.1.3 *Transport of Plutonium and HEU to a CNPC*

If NNSA were to construct and operate a CNPC, Category I/II plutonium and HEU would be consolidated at it. This would entail three potential movements of materials: (1) transfer of LANL's Category I/II plutonium to the CNPC, if LANL is not selected as the host site for the CNPC; (2) transfer of Pantex's non-excess Category I/II plutonium to the CNPC, if Pantex is not selected as the site for the CNPC; and (3) transfer of Y-12's Category I/II HEU to the CNPC, if Y-12 is not selected as the host site for the CNPC. Each of these movements is discussed below.

- Transfer of LANL's Category I/II is discussed in Section 3.4.1.4 regarding a CPC. Transport of LANL's Category I/II plutonium to a CNPC would be the same as the transfer of the material to a CPC.
- Transfer of Pantex's non-excess Category I/II plutonium to a CNPC would occur as follows:
    - Up to 60 metric tons of plutonium, mostly in pit form, would be shipped;
    - Approximately 470 shipments would be required, beginning in approximately 2025 and lasting 5 years.
- Transfer of Y-12's Category I/II HEU to a CNPC would occur as follows:
    - Up to 252 metric tons of HEU would be shipped;
    - Approximately 540 shipments would be required, beginning after approximately 2023 and lasting 5 years.

Table 3.5.1-6 lists the origins, destinations, and materials that would be shipped to support a CNPC. The transfer of LANL, Pantex, and Y-12 Category I/II SNM would be a one-time move. Any transportation of TRU waste and LLW (for a CNPC at Pantex and Y-12) would occur on an annual basis as part of CNPC operations.

Table 3.5.1-6—Origins, Destinations, and Material Shipped to Support the CNPC

Material Transported	CNPC at SRS	CNPC at Pantex	CNPC at Los Alamos	CNPC at NTS	CNPC at Y-12
Los Alamos Plutonium	Los Alamos ⇒ SRS	Los Alamos ⇒ Pantex	LANL ⇒ Los Alamos (intra-site transfer)None	Los Alamos ⇒ NTS	Los Alamos ⇒ Y-12
Pantex Plutonium	Pantex ⇒ SRS	None	Pantex ⇒ Los Alamos	Pantex ⇒ NTS	Pantex ⇒ Y-12
Y-12 HEU	Y-12 ⇒ SRS	Y-12 ⇒ Pantex	Y-12 ⇒ Los Alamos	Y-12 ⇒ NTS	None
TRU waste	SRS ⇒ WIPP	Pantex ⇒ WIPP	Los Alamos ⇒ WIPP	NTS ⇒ WIPP	Y-12 ⇒ WIPP
LLW	Onsite disposal	Pantex ⇒ NTS	Onsite disposal	Onsite disposal	Y-12 ⇒ NTS

3.5.1.4 *Site-Specific Features Relevant to a CNPC*

This section describes a CNPC at each candidate site. While CNPC requirements would be the same at each site, the means of achieving them would vary depending upon the existing facilities and infrastructure at each candidate site. This section also identifies the reference location for a CNPC at each site.

3.5.1.4.1 Los Alamos

A CNPC located at Los Alamos would require the construction of a CPC (which could either be a "Greenfield CPC" [see Section 3.4.1] or an upgrade to existing LANL facilities [see Section 3.4.1.6.1]), a CUC (as described in Section 3.5.1.1), and an A/D/HE Center (as described in Section 3.5.1.2). There would not be enough acreage at TA-55 to locate an entire CNPC. Thus, a CNPC at LANL would be split between two TAs (TA-55 [which could be the site for a CPC and a CUC], and TA-16 [A/D/HE Center]) or completely located in its entirety at TA-16. Figure 3.5.1-2 shows the reference locations for a CPC, CUC, and an A/D/HE Center at LANL.

Because a CPC, CUC, and A/D/HE Center would be constructed sequentially, construction requirements for these three facilities would not create "parallel impacts in time" and are analyzed as sequential actions in this SPEIS. The construction data are summarized in Tables 3.4.1-2, 3.4.1-7, and 3.4.1-8 (CPC), 3.5.1-1 (CUC), and 3.5.1-3 (A/D/HE Center).

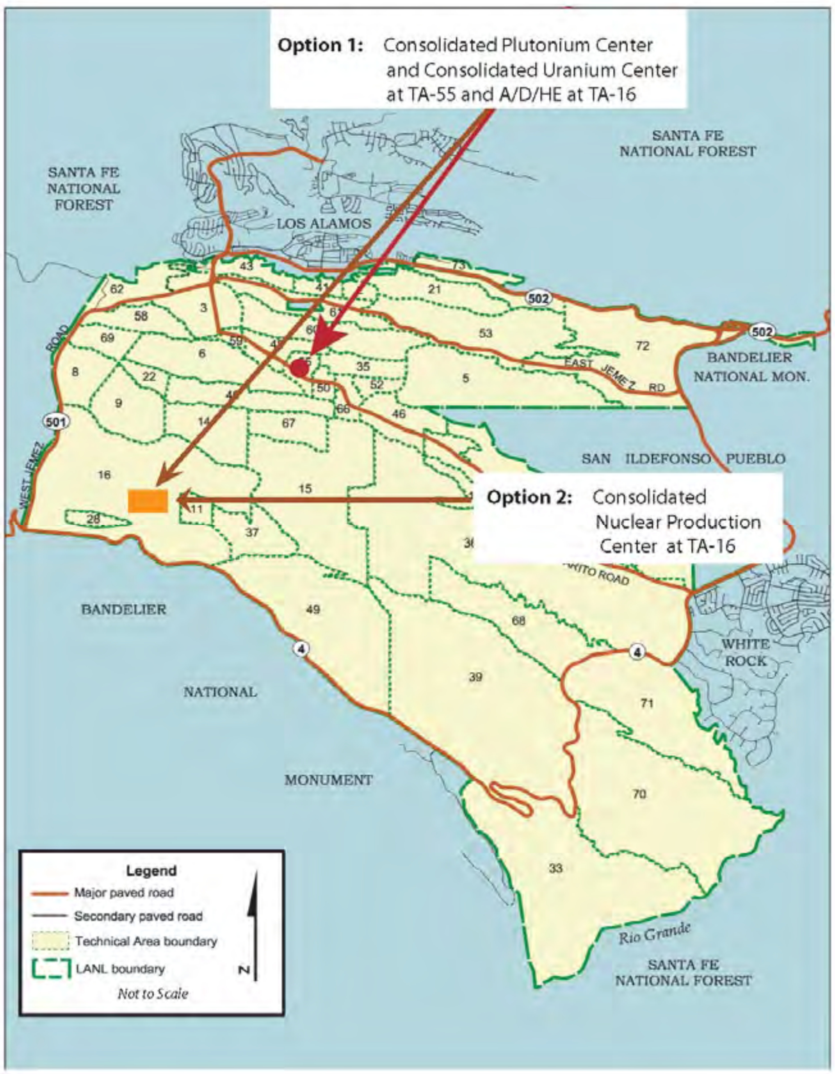


Figure 3.5.1-2—Los Alamos CNPC Reference Locations

3.5.1.4.2 NTS

A CNPC located at NTS would require the construction of a CPC (as described in Section 3.4.1), a CUC (as described in Section 3.5.1.1), and an A/D/HE Center (which would be an upgrade to the existing DAF, as described in this section). Figure 3.5.1-3 identifies the reference locations for a CPC, CUC, and an A/D/HE Center at NTS.

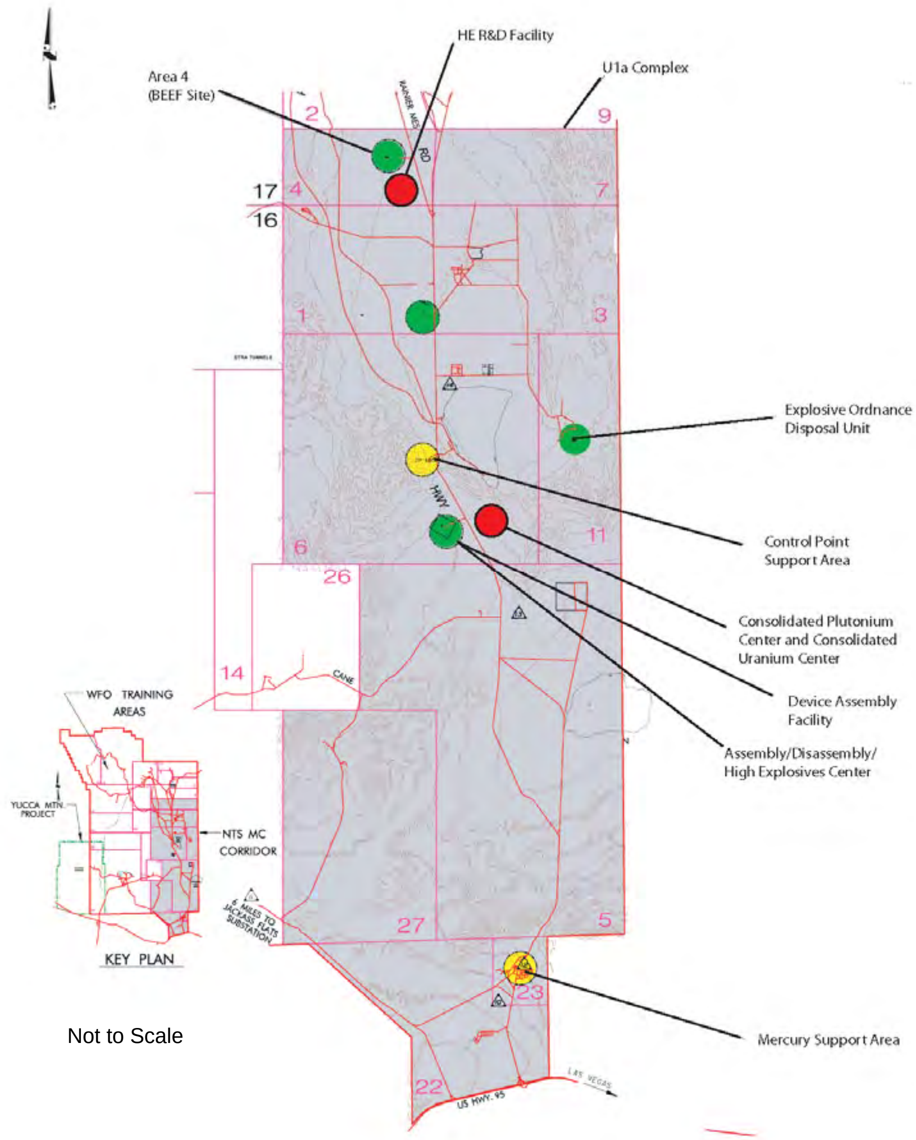


Figure 3.5.1-3—NTS CNPC Reference Locations

The construction data are summarized in Tables 3.4.1-2 (CPC), 3.5.1-1 (CUC), and 3.5.1-4 (A/D/HE Center). Once steady-state operations are achieved in approximately 2025, the operational impacts of a CPC, CUC, and an A/D/HE Center are summarized in Tables 3.4.1-3 (CPC), 3.5.1-2 (CUC), and 3.5.1-5 (A/D/HE).

At NTS, an A/D/HE Center could make use of the existing capabilities at NTS such that construction requirements would be reduced compared to a generic A/D/HE Center described above. An A/D/HE Center at NTS could use existing facilities such as the Device Assembly Facility (DAF); the underground complex of tunnels at the U1a Complex; the Big Explosive Experimental Facility (BEEF); the Explosives Ordnance Disposal Unit; an existing NTS site infrastructure and support areas at Mercury, the Control Point, and Area 6 Construction (Figure 3.5.1-3). By using these existing assets, the need for additional construction would be minimized.

The NTS alternative would use the DAF for disassembly operations. DAF could fully support disassembly operations and continue to support the existing criticality experiments that recently began in the DAF. Disassembly operations in the DAF would not require additional construction within the PIDAS or additions to the existing PIDAS. In the non-PIDAS area of the DAF and outside the buffer zones, an administrative facility and parking area would be constructed to support the increased personnel processing requirements for disassembly.

The remaining operations of assembly, longer-term storage for nuclear and non-nuclear components that are generated by disassembly activities, weapon surveillance, and strategic reserve storage of plutonium would be located approximately 950 feet underground in the tunnel complex at the U1a Complex. This alternative would include construction of new tunnels and alcoves in accordance with nuclear explosive requirements for assembly and storage operations. At the U1a Complex, access to the tunnel network is limited to two (2) vertical access/egress shafts that would require construction of a small PIDAS around the surface footprint of each shaft. Table 3.5.1-7 lists the construction requirements for the A/D/HE Center.

Table 3.5.1-7—A/D/HE Center Construction Requirements at NTS

Requirements	Consumption/Use[25]
Peak Electrical energy (MWe)	250
Diesel Generators (Yes/No)	Yes
Concrete (yd^3)	10,000
Steel (tons)	635
Liquid fuel and lube oil (gallons)	19,100,000
Water (gallons)	1,800,000
Land (acre)	200
Laydown Area Size (acre)	5
Parking lots	30
Footprint of New Construction (ft^2)	330,000
Total Square Footage added (ft^2)	330,000
Employment	
Total employment (worker years)	915
Peak employment (workers)	525
Construction period (years)	2
Wastes Generated	**Volume (yd^3)**
Low Level Waste	9,000
Hazardous Waste	0
Non-Hazardous (Sanitary and Other)	6,400

Source: NNSA 2007.

[25] Construction requirements for employment-related data are based on 85 percent reduction (330,000 square feet versus 2,100,000 square feet for generic A/D/HE Center) due to existing DAF capabilities.

Operations of an A/D/HE Center at NTS would be the same as operations of an A/D/HE Center at other sites.

3.5.1.4.3 Pantex

A CNPC located at Pantex would not require the construction of an A/D/HE Center, as Pantex currently performs these missions in existing facilities. As such, a CNPC at Pantex would entail the construction of a CPC (as described in Section 3.4.1.1) and a CUC (as described in Section 3.5.1.1). Figure 3.5.1-4 identifies the reference location for a CPC and CUC at Pantex (CNPC).

The construction data are summarized in Tables 3.4.1-2 (CPC) and 3.5.1-1 (CUC). Once steady-state operations are achieved in approximately 2022, the operational impacts of both the CPC and CUC are summarized in Tables 3.4.1-3 (CPC) and 3.5.1-2 (CUC).

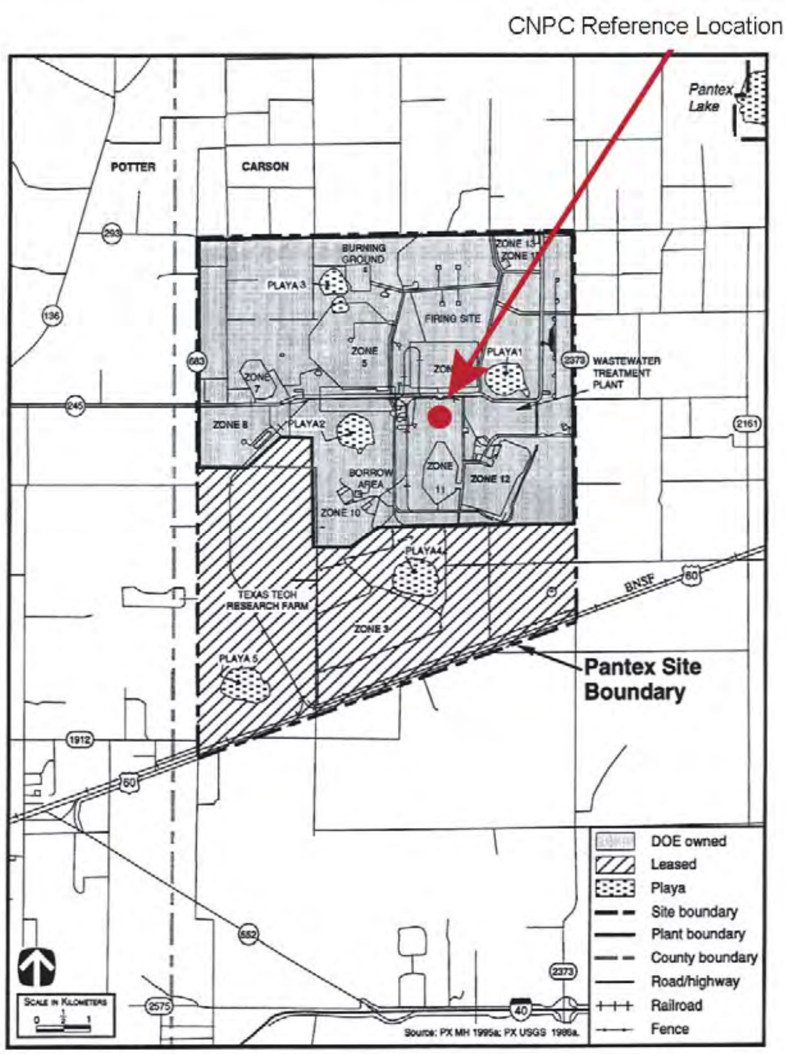


Figure 3.5.1-4—Pantex CNPC Reference Location

3.5.1.4.4 SRS

A CNPC located at SRS would require the construction of a CPC (as described in Section 3.4.1.1), a CUC (as described in Section 3.5.1.1), and an A/D/HE Center (as described in Section 3.5.1.2). Figure 3.5.1-5 identifies the reference location for the CNPC at SRS.

Because a CPC, CUC, and A/D/HE Center would be constructed in series, construction requirements for these three facilities would not create simultaneous impacts and are analyzed as sequential actions in this SPEIS. As such, the construction data in Tables 3.4.1-2 (CPC), 3.5.1-1 (CUC), and 3.5.1-3 (A/D/HE Center) form the basis for the impact analysis in this SPEIS. Once steady-state operations are achieved in approximately 2025, the operational impacts of the CPC, CUC, and the A/D/HE Center are summarized in Tables 3.4.1-3 (CPC), 3.5.1-2 (CUC), and 3.5.1-5 (A/D/HE Center).

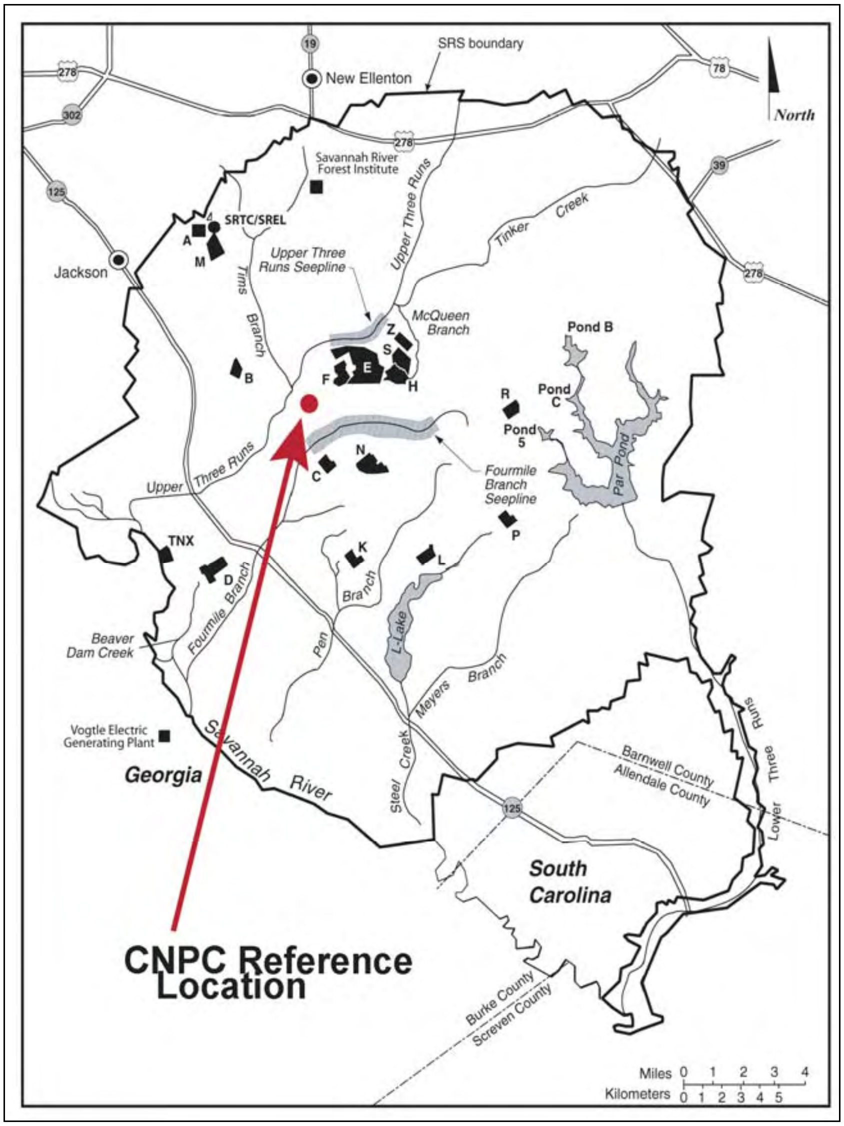


Figure 3.5.1-5—SRS CNPC Reference Location

3.5.1.4.5 Y-12

A CNPC located at Y-12 would require the construction of a CPC (as described in Section 3.4.1.1), a UPF (as described in Section 3.4.2), and an A/D/HE Center (as described in Section 3.5.1.2). A CUC at Y-12 would not require construction of a new HEU storage facility because NNSA is already building a modern storage facility. Figure 3.5.1-6 identifies the reference locations for these facilities at Y-12. The HE component of the A/D/HE mission would be located on the ORR approximately 4.5 miles west of Y-12 site due to buffer and acreage requirements.

Because a CPC, UPF, and A/D/HE Center would be constructed in series, construction requirements for these three facilities would not create simultaneous impact and are analyzed as sequential actions in this SPEIS. As such, the construction data in Tables 3.4.1-2 (CPC), 3.4.2-1 (UPF), and 3.5.1-3 (A/D/HE Center) form the basis for the impact analysis in this SPEIS. Once steady-state operations are achieved in approximately 2025, the operational impacts of the CPC, UPF, and the A/D/HE Center are summarized in Tables 3.4.1-3 (CPC), 3.4.2-2 (UPF), and 3.5.1-5 (A/D/HE Center).

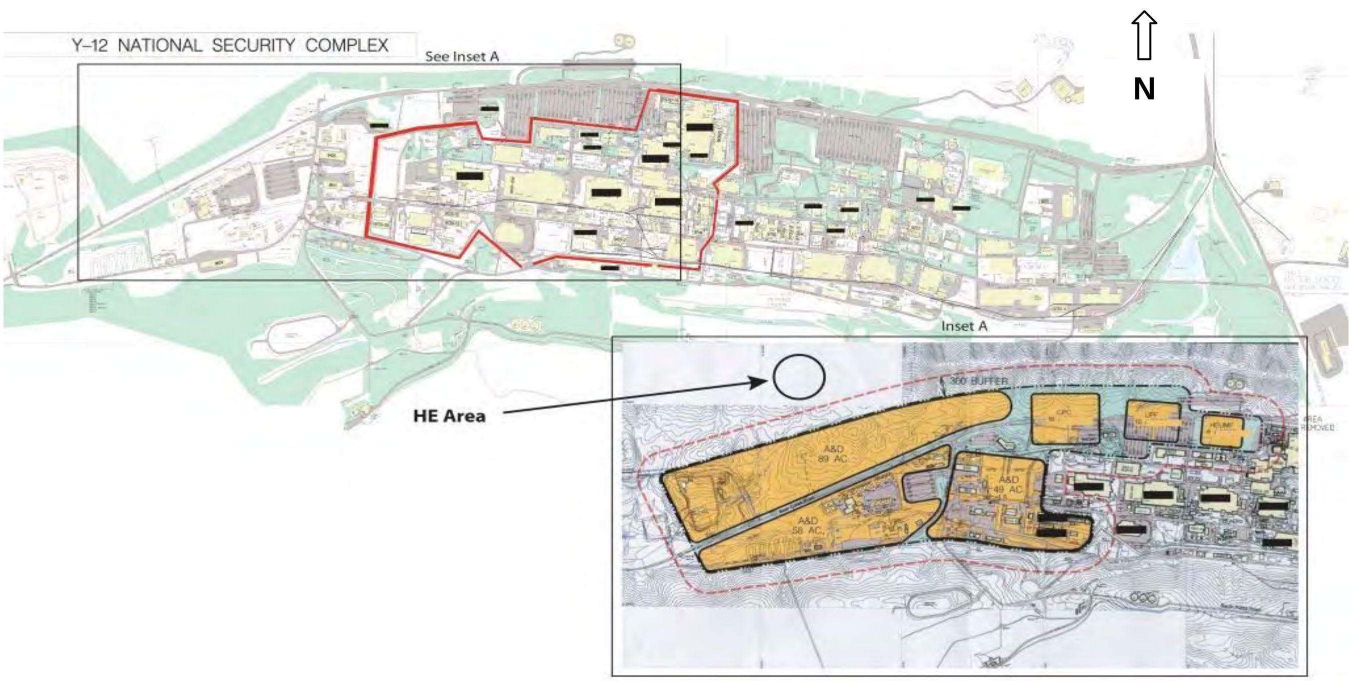


Figure 3.5.1-6—Y-12 CNPC Reference Location

3.5.2 Consolidated Nuclear Center Option

This option would separate the A/D/HE mission to allow NNSA to consider an option that locates the production facilities of a CNPC at a different site than the weapons A/D mission. Under this option, NNSA would construct and operate a CPC and CUC at one site and an A/D/HE facility at either Pantex or NTS. For purposes of this SPEIS, this option is referred to as the CNC. A generic layout of a CNC is shown in Figure 3.5.2-1.

The descriptions of the facilities, along with the representative site locations that constitute a CNC, are contained in Section 3.5.1. Operationally, the major difference between a CNPC and a CNC involves transportation impacts between the nuclear production facilities and the A/D/HE facility. For example, once steady-state operations are achieved in a CNPC, all nuclear missions would occur at a single site and there would be virtually no radiological transportation (with the exception of waste shipments and nuclear weapons shipments between DoD and NNSA). Under the CNC Alternative, radiological transportation would be required between the production facilities and the A/D/HE facility. As such, this SPEIS assesses the radiological transportation impacts per the matrix of alternative configurations shown in Table 3.5.2-1.

Table 3.5.2-1—Alternative Configurations of the CNC

If A/D/HE is at:	Then CNC would be located at one of the following locations:			
	SRS	NTS	Los Alamos	Y-12
Pantex	x	x	x	x
NTS	x		x	x

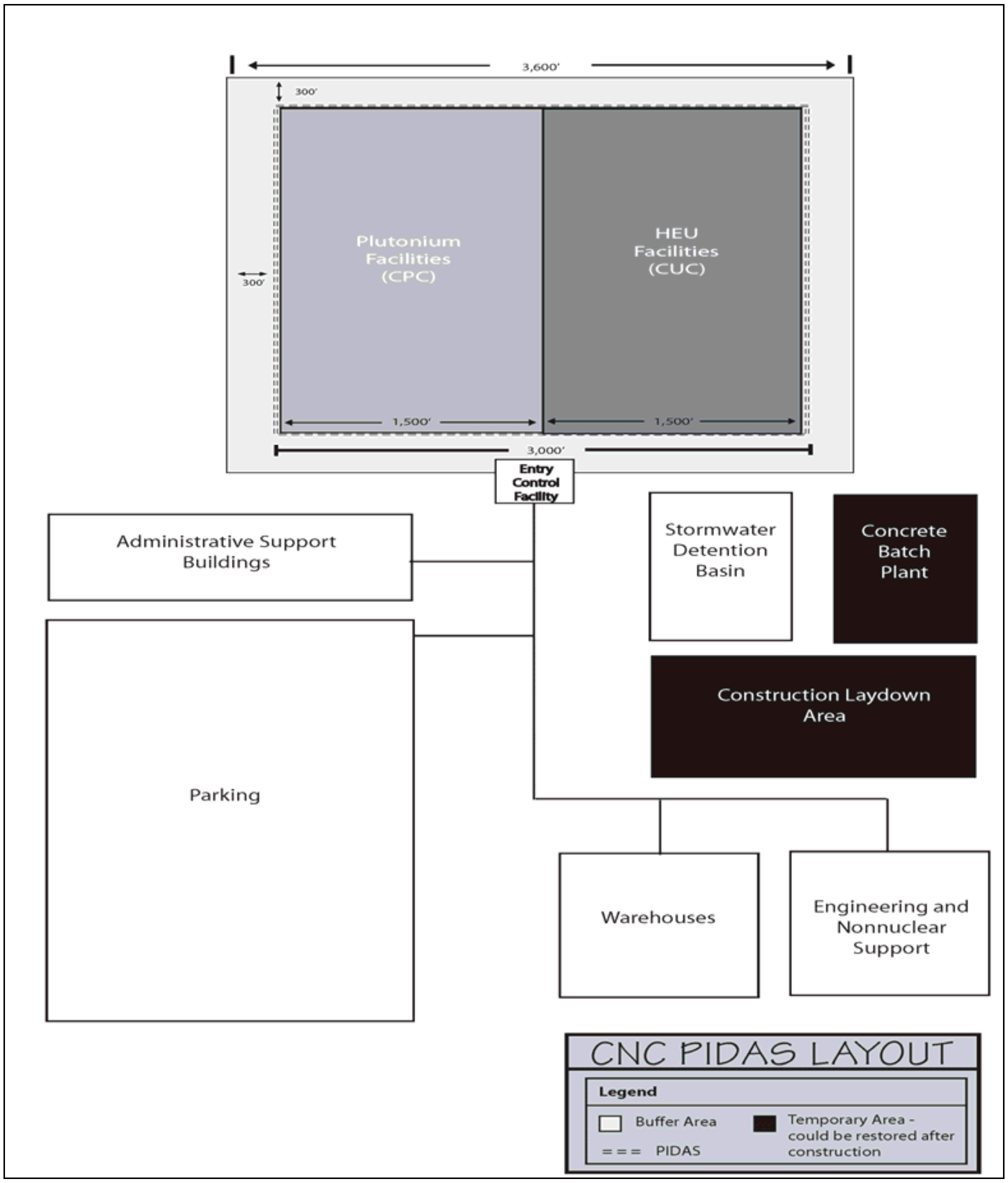


Figure 3.5.2-1—Generic Layout of the CNC

3.6 PROGRAMMATIC ALTERNATIVE 3: CAPABILITY-BASED ALTERNATIVE

The nuclear weapons stockpile and the Complex have undergone profound changes since the end of the Cold War. Since that time, more than 12,000 United States nuclear weapons have been dismantled, no new-design weapons have been produced, three former nuclear weapons plants (Mound, Pinellas, and Rocky Flats) have been closed, nuclear material production plants (Hanford, K-25 at ORR, most of SRS, and Fernald) have stopped production and are being decontaminated, and the United States is observing a moratorium on nuclear testing.

In 2002, President Bush and President Putin signed the *Moscow Treaty*, which will reduce the number of operationally deployed strategic nuclear weapons to 1,700-2,200 by 2012. In 2004, President Bush issued a directive to cut the entire U.S. stockpile—both deployed and reserve warheads—in half by 2012. This goal was later accelerated and achieved 5 years ahead of schedule in 2007. As of the end of 2007, the total stockpile was almost 50 percent below what it was in 2001. On December 18, 2007, the White House announced the President's decision to reduce the nuclear weapons stockpile by another 15 percent by 2012. This means the U.S. nuclear stockpile will be less than one-quarter its size at the end of the Cold War—the smallest stockpile in more than 50 years (D'Agostino 2008).

As these actions illustrate, the Administration's goal is to achieve a credible nuclear deterrent with the lowest possible number of nuclear warheads consistent with national security needs. NNSA's analyses in this SPEIS are based on current national policy regarding stockpile size (1,700-2,200 operationally deployed strategic nuclear warheads) with flexibility to respond to future Presidential direction to change the size. NNSA also assumes that it must continue to maintain an arsenal of some number of nuclear weapons. Maintaining a stockpile requires the ability to detect aging effects in weapons (a surveillance program), the ability to fix identified problems without nuclear testing (the stockpile stewardship program), and the ability to produce replacement components and reassemble weapons (a fully capable set of production facilities). Currently, there are some elements of the Complex that are unable to safely or reliably perform their assigned production mission (e.g., CMR at LANL and Building 9212 at Y-12). Therefore, new facilities are required to perform the essential production missions of these facilities.

Although the size of the stockpile beyond 2012 is not known, the trend suggests a significantly smaller one. Consistent with this trend, NNSA developed a programmatic alternative, referred to as the "Capability-Based Alternative," to analyze the potential environmental impacts associated with a Complex that would support stockpiles smaller than those currently planned. NNSA has assumed that such a stockpile would be approximately 1,000 operationally deployed strategic nuclear warheads. The objective of this analysis is to identify the potential environmental impacts that are particularly sensitive to assumptions about the size of the future stockpile. In addition, analysis of this alternative enhances NNSA's understanding of the infrastructure that might be appropriate if the United States continues to reduce stockpile levels. Within the Capability-Based Alternative, NNSA has analyzed two options:

(1) A Capability-Based Alternative that would maintain a basic manufacturing capability to produce nuclear weapons, as well as laboratory and experimental capabilities to support the stockpile. It would reduce the operational capacity of production facilities to a throughput of

approximately 50 weapons per year. This alternative involves pit production at LANL of 50 pits per year and reductions of production capacities at Pantex, Y-12, and SRS. This alternative is described in detail in Section 3.6.1.

(2) A No Net Production/Capability-Based Alternative that would produce a limited number of components and assembly of weapons beyond those associated with supporting surveillance, but would not involve adding new types or increased numbers of weapons to the total stockpile. This alternative involves a minimum production (production of 10 sets of components or assembly of 10 weapons per year) to maintain capability and to support a limited Life Extension Program (LEP) workload. This alternative, which NNSA added after considering public comments on the Draft SPEIS, is described in detail in Section 3.6.2.

The two options analyzed for the Capability-Based Alternative might not provide the optimum configuration of the Complex if the stockpile became much smaller. In such a situation, NNSA could make changes to the Complex beyond those described in Sections 3.6.1 and 3.6.2. Section 3.6.3 discusses further changes to the Complex that might be reasonable if the stockpile were reduced even further (to hundreds of weapons) beyond the levels considered in Sections 3.6.1 and 3.6.2. That discussion focuses on how the programmatic alternatives considered in this SPEIS could be adapted to such a small stockpile. NNSA acknowledges, however, that any decision to reduce the stockpile to those levels could result in a need to reassess the transformation options for the Complex.

3.6.1 Capability-Based Alternative for Production Facilities

For purposes of this alternative, the nuclear weapons production sites are:

- LANL—producing pits;
- Y-12—producing secondaries and cases;
- SRS—processing tritium and other tritium activities; and
- Pantex—producing HE components and performing weapons assembly/disassembly.

This section discusses how each of these sites would operate in the Capability-Based Alternative. Because LANL does not have adequate capacity to support stockpile requirements expected in the future, as do the other production facilities, LANL would proceed with the CMRR-NF which would support metallurgy chemical activities to support pit production, in order to produce as many as 50 pits per year. At other production sites, capacity could be reduced.[26]

The following sections provide specific information about each of the four production facilities.

3.6.1.1 *Capability-Based Alternative for LANL*

The LANL SWEIS (LANL 2008) assesses several alternatives, including one that would establish an interim fabrication capacity of up to 50 certified pits per year. Under the Capability-

[26] For this alternative, the SPEIS analyzes options that would maintain missions within existing facilities by reductions in place. NNSA acknowledges that new facilities such as a CPC, CNPC, or a CNC, with smaller capacities, could be built in support of a capability based alternative. However, the SPEIS already analyzes reasonably-sized new facilities that could be operated with smaller throughputs. Section 3.15 discusses why new facilities, of smaller capacities, are not analyzed in detail in this SPEIS.

Based Alternative, that would not change. The SWEIS describes the specific actions that would be required to add up to 50 certified pits per year to the stockpile. For a description and analysis of the specific actions, the reader is directed to the Final LANL SWEIS. A summary of the major pit production actions follows:

- **CMRR**. NNSA is continuing the preliminary design of the CMRR-NF. NNSA will decide whether to construct this facility after completion of this SPEIS. Should another site be selected for pit production, this nuclear facility might still be constructed at LANL in order to provide metallurgy chemical activities in support of an interim pit production capability until a new pit production facility is available. In any case, NNSA has determined that preliminary design of the CMRR-NF would be applicable to any future pit production facility at any site analyzed in this SPEIS.

- **Other upgrades at TA-55.** A series of upgrades would be made at TA-55, including: heating, ventilation, and air conditioning systems; PF-4 roof replacement; confinement doors in PF-4; criticality alarm system; fire sprinkler piping; fire alarm system; replacement of cooling towers; any necessary seismic upgrades; and others.[27]

3.6.1.2 *Capability-Based Alternative for Pantex*

Pantex is responsible for the production of HE and the assembly/disassembly of weapons. Approximately one-half of its current and future workload is associated with weapons dismantlements. Under the Capability-Based Alternative, NNSA would continue dismantlement activities at Pantex. If future stockpile requirements decreased significantly, this would result in an increased need for dismantlements at Pantex. For purposes of this analysis, it is assumed that dismantlement activities would continue at current rates for an even longer period of time compared to the No Action Alternative. As such, this alternative assumes that approximately one-half of the operations at Pantex would not change for the foreseeable future. With respect to other operations (most notably weapons assembly and HE fabrication), this alternative assumes a 50 percent reduction in these activities.

The reduction in weapons assembly and HE fabrication would reduce the number of employees; waste generation; infrastructure needs; and overall worker doses. Estimates of these reductions are in Table 3.6.1-1. Safeguard and security expenditures would remain at current levels, and other operations conducted at Pantex, such as the storage of pits, dismantlement of retired weapons, and stockpile surveillance activities, would remain at current levels, consistent with the levels described for the No Action Alternative in Section 3.3.

[27] See ROD for the continued operation of the LANL for decisions from the expanded operations alternative (see 73 FR 55833).

Table 3.6.1-1—Annual Operation Requirements and Estimated Waste Volumes for the Capability-Based Alternative at Pantex Compared to the No Action Alternative

Requirements	No Action Alternative	Capability Based Alternative[a]
Electrical Energy Use (MWh)	81,850	61,000
Water Use (gallons)	130,000,000	97,500,000
Site Employment (workers)	1,644	1230
Number of Radiation Workers	334	250
Average Worker Dose (mrem)	132	132
Total Worker Dose (person-rem)	44.1	33.0
Waste Category		
Low-level Waste (yd^3)	96.8	73
Mixed Low-level Waste (yd^3)	1.8	1.4

[a] For a 50 percent reduction in production, this alternative estimated a 25 percent reduction in infrastructure requirements, personnel requirements, emissions, and waste generation. Average worker dose would remain approximately the same, but a reduced workforce would reduce total worker dose.
Source: NNSA 2007.

3.6.1.3 *Capability-Based Alternative for Y-12*

Y-12 is responsible for producing secondaries and cases, dismantling secondaries from weapons disassembly operations, and storage of HEU. Less than one-quarter of the current and future Y-12 workload is associated with weapons dismantlements. Under the Capability-Based Alternative, NNSA would continue to dismantle secondaries at Y-12. If the future stockpile decreased significantly, dismantlements would need to increase. This alternative assumes that dismantlement activities would continue at current rates for an even longer period of time compared to the No Action Alternative. As such, this alternative assumes that less than one-quarter of the operations at Y-12 would change for the foreseeable future. With respect to other operations (most notably the production of secondaries), this alternative assumes a 50 percent reduction in these activities. With respect to producing secondaries and cases, which accounts for the majority of the Y-12 nuclear workload, this alternative assumes a 50 percent reduction in these activities.

The reduction in workload would reduce employees, waste generation, infrastructure needs, and the total worker dose. Estimates of these levels appear in Table 3.6.1-2. Safeguard and security expenditures would remain at current levels, and other operations conducted at Y-12, such as the storage of HEU and dismantlement of secondaries, would remain at current levels, consistent with the expected levels described in the No Action Alternative in Section 3.3.

Table 3.6.1-2—Annual Operation Requirements and Estimated Waste Volumes for the Capability-Based Alternative at Y-12 Compared to the No Action Alternative

Requirements	No Action Alternative	Capability Based Alternative[a]
Electrical Energy Use (MW)	360-480	220-290
Water Use (million gallons/year)	2,000	1,200
Y-12 Site Employment (workers)	6,500	3,900
Steam Plant Generation (billion pounds)	1.5	0.9
Normal Radiological/Uranium Air Emissions (Curie)	0.01	0.006
Number of EU Radiation Workers	839	500
Average worker-dose for EU Worker (mrem)	38.1	38.1
Total dose to EU Radiation Workers (person- rem)	32.0	19.1
Waste Category		
Low-level Waste		
Liquid (yd^3)	17.4	10.4
Solid (yd^3)	7,800	4,700
Mixed Low-level Waste		
Liquid (yd^3)	17.9	10.7
Solid (yd^3)	21.1	12.7

[a] For a 50 percent reduction in production, this alternative estimated a 40 percent reduction in infrastructure requirements, personnel requirements, emissions, and waste generation. Average worker dose would remain approximately the same, but a reduced workforce would reduce total worker dose
Source: NNSA 2007.

3.6.1.4 *Capability-Based Alternative for SRS*

SRS is responsible for extracting tritium (from tritium producing burnable absorber rods irradiated in a TVA reactor) and filling tritium reservoirs for nuclear weapons. Under the Capability Based Alternative, tritium activities at SRS would be reduced significantly, as NNSA could likely meet its tritium requirements through a combination of tritium recycle and limited extraction. As such, it is conceivable that tritium operations could be reduced to approximately 50 percent compared to the No Action Alternative. This reduction would require fewer employees, reduce waste generation, reduce infrastructure needs, and lower the total worker-dose. Estimates of these reductions appear in Table 3.6.1-3. Safeguards and security would remain at current levels, and other non-tritium operations conducted at SRS, such as the MOX program, would not change. Table 3.6.1-3 presents relevant operational reductions from the higher stockpile levels of the 1990s to the No Action Alternative to the Capability Based Alternative.

Table 3.6.1-3—Annual Operation Requirements and Waste Volumes for the Capability Based Operations Alternative at SRS Compared to Other Tritium Activity Levels

Requirements	Tritium Activities to Support 1990's Stockpile[a]	No Action Alternative	Capability Based Alternative
Electrical Energy Use at Tritium Facilities (MWh)	32,400	27,500	22,500
Water Use at Tritium Facilities (gallons)	43,000	36,550	30,100
Normal Tritium Air Emissions (Curies)	21,700	10,350	2,500
Number of Tritium Workers [b]	148	110	85[a]
Average worker-dose for Tritium Worker [c] (mrem)	37	37	37
Total worker-dose (person-rem)	5.5	4.1	3.1
Waste Category			
Low-level Waste Solid (yd^3)	275	138	69
Mixed Low-level Waste and Hazardous Waste Solid (yd^3)	12	6	3
Nonhazardous (Sanitary) Waste (gallons/year)	27,500	23,375	19,250

[a] Based on Tritium Extraction Facility EIS (DOE 1999i) and the EA for the Tritium Facility Modernization and Consolidation Project at SRS (DOE 1998a).
[b] Reductions in workforce would not be directly proportional to throughput reduction due to support personnel. A 50 percent reduction in throughput would reduce worker requirements by approximately 25 percent.
[c] Average worker dose would remain constant, but total workforce would be reduced for reduced throughput.
Source: NNSA 2007.

3.6.2 No Net Production/Capability-Based Alternative

In response to numerous comments stating that there was no need to build any nuclear weapons, and that NNSA failed to consider an alternative consisting of a Complex that would not manufacture weapons, NNSA added a No Net Production/Capability-Based Alternative to the Final SPEIS. This alternative would require the production of a limited number of components and assembly of weapons beyond those associated with supporting surveillance, but would not involve adding new types or increased numbers of weapons to the stockpile. This alternative would also include the capability for continued surveillance, limited life component (LLC) production, and weapon (and component) dismantlement. At the plants, surveillance would include the capabilities to disassemble weapons, conduct evaluations and component testing, and re-assemble weapons using their original or replacement components. At the laboratories, surveillance would include the capability to address any anomalies detected. NNSA would continue to need capabilities such as weapon design and certification, R&D, hydrotesting, flight testing, environmental testing, and HE R&D to assess and undertake corrective actions for detected problems.

NNSA would still need a nuclear weapons complex under this alternative to support the surveillance program, LLC production, dismantlement, and the capability for all required weapons functions. These functions would require NNSA to maintain a minimal production capacity of approximately 10 sets of components or assembly of 10 weapons per year. The

CMRR-NF could still be needed to support metallurgy chemical activities to support pit production, and a minimum UPF to replace existing facilities at Y-12 could still be needed.

Over time, a No Net Production/Capability-Based Alternative could result in a declining stockpile due to accelerated consumption of components for re-assembly of surveillance units and possibly due to problems identified in an aging stockpile. Sections 3.6.2.1 through 3.6.2.7 discuss the No Net Production/Capability-Based Alternative for each of the Complex sites. The environmental impacts of this alternative are presented in Section 5.1 through 5.9.

3.6.2.1 *No Net Production/Capability-Based Alternative at LANL*

Under this alternative, LANL would continue nuclear design, perform Pu R&D, perform pit surveillance, maintain the capability to produce pits and non-nuclear components, and perform HE R&D and hydrotesting. LANL operations would also include non-weapons activities and work for others. The CMRR-NF would be constructed and would replace the CMR.

Most changes at LANL for this alternative would be minimal for all resource areas except worker health, waste management, and transportation. Worker dose is estimated to decrease to approximately 45 person-rem (a 50 percent reduction compared to 20 ppy production, and a reduction of approximately 80 percent compared to 80 ppy production). LLW from plutonium operations would be reduced to 68 cubic yards per year, and TRU waste generation would be reduced to 42 cubic yards per year. The reduced pit production and wastes would require proportionately less transportation (NNSA 2008).

3.6.2.2 *No Net Production/Capability-Based Alternative at LLNL*

Under this alternative, LLNL would maintain its weapons design and certification mission, and would continue nuclear weapons activities related to stockpile stewardship requiring unique facilities at the main site (e.g. NIF and HEAF). LLNL would cease hydrotesting and environmental testing at Site 300 for NNSA's weapons program. LLNL would continue to conduct non-weapons activities and work for others at both the LLNL main site and Site 300. Also, NNSA would continue activities needed to sustain capabilities to complete weapon design and certification without a commitment to complete new designs or LEPs under this alternative.

The LLNL main site would maintain existing capabilities and conduct ongoing research and development activities. Site 300 capabilities would be maintained for non-weapons activities and work for others. There could be a slight decrease in operations at Site 300 as fewer research and development tests are conducted; however, the requirement to keep the facility operational would not change. A small portion of Site 300 consisting of high explosives waste treatment, high explosives magazine storage, and support functions for HEAF would remain in operation. This alternative would not be significantly different from the No Action Alternative at LLNL.

3.6.2.3 *No Net Production/Capability-Based Alternative at NTS and TTR*

There would be no changes at NTS or TTR for this alternative.

3.6.2.4 *No Net Production/Capability-Based Alternative at Pantex*

Under this alternative, NNSA would maintain the capability to disassemble and re-assemble weapons, perform HE R&D, and conduct surveillance testing to ensure maintenance of capability for all active weapon types at Pantex. Pantex would continue to support surveillance, dismantlement, and HE R&D activities to fully support NNSA missions. In addition, Pantex would perform approximately 44 weapon assemblies per year in order to maintain assembly capabilities across all programs. This quantity represents a combination of surveillance rebuilds and LEP assemblies, and would be required to ensure that Production Technicians maintain qualification.

Staffing would be reduced commensurate with reduced production needs and would impact workers in production, radiation support, systems and process engineering, and indirect services. This reduced workload would create approximately 10 excess production facilities; however, these facilities would be maintained in a "ready-to-use" state, in the event changes were directed by the President. The utility infrastructure would need to be maintained to support fire suppression systems, ventilation, freeze prevention, steam, and chilled and potable water. The security posture would remain consistent. Table 3.6.2.4-1 presents the major changes expected at Pantex under this alternative.

Table 3.6.2.4-1—Annual Operation Requirements at Pantex for a No Net Production/Capability-Based Alternative

Requirements	No Action Alternative	Capability Based Alternative	No Net Production/ Capability-Based Alternative
Electrical Energy Use (MWh)	81,850	61,000	54,000
Water Use (gallons)	130,000,000	97,500,000	85,800,000
Site Employment (workers)	1,644	1230	1,085
Number of Radiation Workers	334	250	220
Average Worker Dose (mrem)	132	132	132
Total Worker Dose (person-rem)	44.1	33.0	29.0
Waste Category			
Low-level Waste (yd^3)	96.8	73	64
Mixed Low-level Waste (yd^3)	1.8	1.4	1.2
Hazardous Waste (yd3)	711	530	470
Nonhazardous Waste (yd3)	6,375	4,800	4,200

Source: NNSA 2007, NNSA 2008.

3.6.2.5 *No Net Production/Capability-Based Alternative at SNL/NM*

Under this alternative, SNL/NM would continue non-nuclear design and engineering missions, perform limited life component manufacture, and perform HE R&D, major environmental testing, and flight testing activities. The only major change at SNL/NM would involve workforce reductions. Site employment would be reduced from approximately 8,730 to 8,450. The number of radiation workers would be reduced from approximately 270 to 260.

3.6.2.6 *No Net Production/Capability-Based Alternative at SRS*

Under this alternative, SRS would continue tritium extraction and reservoir loading and unloading at a reduced rate required to support the stockpile and retain a viable, responsive capability to supply tritium. Limited tritium R&D would be maintained. No significant changes are expected for the major annual operation requirements or the workforce.

3.6.2.7 *No Net Production/Capability-Based Alternative at Y-12*

Under this alternative, NNSA would maintain capability to produce a limited number of weapons components for Life Extension Program work at Y-12. Support for the Life Extension Program would be in the range of 12-15 subassemblies per year (slightly over one a month) to ensure maintenance of capability for all active weapon types. This capacity is slightly higher than 10 subassemblies per year due to the need to keep varying equipment and production staff fully qualified on systems necessary to support the different LEP stockpile variants. In this alternative, Y-12 would continue to support surveillance, dismantlement, and storage activities to fully support NNSA missions, and provide uranium support to all other NNSA and non-NNSA customers. To support this alternative, Y-12 would build a small Uranium Processing Facility (UPF) at Y-12. This "minimum UPF"[28] would maintain all capabilities for fabricating limited LEP subassemblies, and capabilities for planned dismantlement, surveillance and uranium work for other NNSA and non-NNSA customers. Other Y-12 production facilities which are not included in the UPF would remain consistent with the Capability-Based Alternative: production facilities for lithium, depleted uranium, special materials and general manufacturing would retain capabilities but produce much smaller quantities. The HEUMF would remain to provide the capability for SNM storage.

Although many of the current production facilities would not be fully utilized, NNSA would need to maintain them in a "ready-to-use" state in the event changes were directed by the President. This means unused capacity would be exercised periodically and standard preventative maintenance and minimal corrective maintenance would be performed on all equipment that could be required for future needs. The related effects on other plant operations of this alternative would include a small reduction in utility usage and waste generation, a reduction in staffing below the Capability-Based Alternative, and a steady security posture. Table 3.6.2.7-1 presents the operational information for the Y-12 No Net Production/Capability-Based Alternative.

[28] The primary difference between a minimum UPF and the UPF considered under the Distributed Centers of Excellence Alternative would be capacity. In order to maintain the basic capability to perform the enriched uranium missions, all of the required enriched uranium processes must be included in the facility. In many cases, installing the basic processes in the facility would allow the facility to support multiple units per year. The "minimum UPF" would be a smaller facility that contains all processes but less equipment; however, the facility would not be significantly smaller than the current UPF design.

Table 3.6.2.7-1—Annual Operational Requirements for the Y-12 No Net Production/Capability-Based Alternative

Requirements	No Action Alternative	Capability Based Alternative	No Net Production/ Capability-Based Alternative
Electrical Energy Use (MW)	360-480	220-290	200-260
Water Use (million gallons/year)	2,000	1,200	1,080
Y-12 Site Employment (workers)	6,500	3,900	3,400
Steam Plant Generation (billion pounds)	1.5	0.9	0.8
Normal Radiological/Uranium Air Emissions (Curie)	0.01	0.006	0.005
Number of EU Radiation Workers	839	500	450
Average worker-dose for EU Worker (mrem)	48.6	48.6	48.6
Total dose to EU Radiation Workers (person- rem)	40.8	24.3	21.6
Waste Category			
Low-level Waste			
Liquid (yd^3)	17.4	10.4	9.6
Solid (yd^3)	7,800	4,700	4,400
Mixed Low-level Waste			
Liquid (yd^3)	17.9	10.7	9.9
Solid (yd^3)	21.1	12.7	11.7

Source: NNSA 2008.

3.6.3 Further Stockpile Reductions

This section presents a qualitative analysis of the possible effects on programmatic alternatives if the President directed stockpile reductions beyond those described in Sections 3.6.1 and 3.6.2. Any such change in requirements would depend on two factors, (1) when a decision is made to reduce the stockpile; and (2) the size of the future stockpile.

With respect to maintaining the core competencies of the United States in nuclear weapons, and the technical problems of maintaining the safety and reliability of a smaller, aging stockpile in the absence of nuclear testing, NNSA does not believe that stockpile size alone would change the need for the nuclear weapons *laboratory* facilities unless the nation were to abandon the option of returning to a nuclear weapons state. On a gradual path to a very small stockpile (for example, if the President were to direct that the stockpile be reduced to several hundred weapons), size alone could change the need for nuclear weapons *production* facilities. For example, at some point on a path of denuclearization, closure and further consolidation of production sites could become reasonable, rather than reducing facilities in-place.

3.6.3.1 *Distributed Centers of Excellence Alternative*

Assuming that NNSA proceeds with the DCE Alternative, if the nuclear weapons stockpile were significantly reduced, NNSA would be in position to reduce production activities to the levels that could be supported by the capability-based alternatives described in Section 3.6.1 and 3.6.2. Because both Y-12 and Pantex would need to support increased dismantlements, these facilities would continue to operate. If NNSA decides to proceed with a CPC, depending upon the date when the President directs even further reductions in the stockpile, NNSA would assess alternatives for reducing the facility, consolidating additional missions into the CPC, or upgrading LANL plutonium facilities (if LANL is not chosen as the site for the CPC).

At some point following completion of the bulk of dismantlements, closure and further consolidation of production sites could become reasonable. In such a case, NNSA currently envisions that such a Complex might be reconfigured as follows:

- LLNL, LANL, and SNL could become smaller R&D laboratories;
- The CPC site or Y-12 (assuming a UPF is built there) could become the location for production of all components involving Category I/II quantities of SNM;
- NTS could become the site for A/D/HE operations and any high-hazard testing;
- SRS would remain the tritium production site;
- Pantex would be closed; and
- Y-12 would be closed if not selected for a CPC and a UPF is not built there.

Transitioning to a complex such as the one described above would produce the greatest environmental changes at Pantex, which would be closed (and perhaps Y-12, if it were closed). The impacts of D&D associated with such closure are addressed in this SPEIS in Sections 5.5.15 and 5.9.15, as part of the analysis for locating a CNPC at sites other than Pantex and Y-12. The impacts of such D&D are not repeated in this section. Once D&D was complete these sites could be used for a variety of purposes from industry to wildlife refuges, as happened at the former Rocky Flats Plant. The future use would in large part determine the potential environmental impacts. Minor impacts would be expected at LLNL, LANL, and SNL, which would continue R&D missions, but could be further downsized.

Transitioning to a much smaller Complex would result in minimal impacts at SRS. Tritium operations would be further reduced, which would have positive impacts related to the amount of wastes generated, the number of radiological workers, tritium emissions, and radiological exposures to both workers and the public. However, as described in Section 5.8, the impacts from tritium operations do not result in significant impacts; as such, any reductions in impacts would not be major. Major additional quantities of SNM might be declared surplus, which could create a need to extend ongoing disposition activities, some of which are currently conducted at SRS. Surplus plutonium could be used for mixed-oxide fuel for commercial reactors, or as a fuel source for advanced reactors that might be fueled with transuranic materials, or dispositioned with other surplus plutonium. Surplus HEU could be down-blended as fuel for commercial reactors, or used a fuel source for future naval reactors.

Transitioning to a much smaller Complex could result in mission changes at NTS, as the A/D/HE mission could be transferred to this site. For the small throughputs needed to support reduced operations, the DAF would likely be large enough to support this mission. The DAF is a collection of more than 30 individual buildings connected by a rectangular common corridor. The entire complex, covered by compacted earth, covers an area of 100,000 square feet. Safety systems include fire detection and suppression, electrical grounding, independent heating, ventilation and air-conditioning systems with high-efficiency particulate air filters, loud speaker and alarm systems, and warning lights. In operational areas, pairs of blast doors, designed to mitigate the effects of an explosion, are interlocked so that only one door may open at a time.

The DAF contains five assembly cells; four high bays; three assembly bays; one of which houses a glove box, and one of which houses a down draft table; and two radiography bays. Five staging bunkers provide space for staging nuclear components and high explosives. Minor new construction would likely be required to produce HE components.

3.6.3.2 *Consolidated Centers of Excellence Alternative*

If NNSA were to decide to pursue the Consolidated Centers of Excellence Alternative (with either a CNPC or CNC), the difference in nuclear floor space required to meet programmatic production requirements would probably not impact the design and construction of the facility to any appreciable extent (in comparison to overall costs of the project) due to the minimum amount of equipment necessary to achieve specific capacities and the corresponding floor space required. For example, the amount of equipment to produce one pit has an inherent capacity to produce a larger quantity. There are few differences in the amount of equipment needed for capacities of 20 to 80 pits compared to 125 pits to significantly alter the amount of floor space required such that significant cost savings would be accrued in comparison to total project costs. In addition, the operating costs would not be significantly different because a large portion of the costs are associated with maintaining the facilities and their operation.

If the stockpile were reduced to several hundred weapons and the decision was made to reduce the stockpile after the new facilities (e.g. uranium, plutonium, and assembly/disassembly) called for under this alternative were in place, there would be floor space in excess of what would be required. However, the costs and benefits of the excess space would have to be weighed against a number of factors. There would be cost benefits from having the facilities needed to transform the stockpile quickly, and allowing for further reduction of the stockpile. In addition, consolidation of nuclear material would still bring cost savings; and synergy between plutonium and uranium component infrastructure would remain. Any decision to reduce the stockpile would increase dismantlement activities and reduce production activities. Transition of personnel from one activity to another would be facilitated more quickly with the personnel already at the site. Although the facilities might be larger than necessary, much of the costs to maintain the facilities, due to the safety and security aspects of handling Category I/II levels of material would still be realized regardless of the facility size. Additional space would also serve as a contingency should there be changes in requirements for the stockpile or other NNSA responsibilities.

The candidate sites for a CNPC or CNC if the stockpile were reduced to several hundred weapons would not be different than the ones under consideration now. The possibility of stockpile reductions to the level of several hundred would make alternatives that locate more capabilities at a single site more attractive. A small stockpile requires less work in all mission areas. Therefore, total consolidation allows greater flexibility in cross-training and cross-utilization of key skills. The sites to be considered for a total consolidation would be the same as the sites considered for larger stockpiles.

Any new structures NNSA may decide to build would probably not be constructed at the same time the President makes a decision to reduce the stockpile further. During the construction of CNPC or CNC facilities, savings could occur through redesign of facilities in line with the new stockpile. However, NNSA would have to evaluate whether there would be significant cost benefits in redesigning and constructing the facility or continuing based on the status of the project and programmatic requirements. NNSA believes that the Consolidated Centers of Excellence Alternative (especially with a CNPC) would be the least adaptable alternative if the stockpile were reduced to hundreds of weapons.

3.6.3.3 *Capability-Based Alternatives*

Both the Capability-Based Alternative and the No Net Production/Capability-Based Alternative would support a smaller stockpile in a similar way as described for the Distributed Centers of Excellence. NNSA notes that the Capability-Based Alternatives would move the nation more closely to the path that would best support a stockpile of hundreds of weapons.

3.7 CATEGORY I/II SNM CONSOLIDATION ALTERNATIVES

Category I/II quantities of SNM are stored at six NNSA sites: LLNL, LANL, NTS, Pantex, SRS, and Y-12. NNSA is seeking to reduce security costs and increase safety through SNM consolidation. As a result, the future complex is expected to have fewer sites and fewer locations within sites with Category I/II quantities of SNM. This section describes proposals related to Category I/II SNM consolidation alternatives.

As defined in section 11 of the *Atomic Energy Act* of 1954, SNM are: (1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which DOE or the U.S. Nuclear Regulatory Commission determines to be SNM; or (2) any material artificially enriched by plutonium or uranium 233 or 235. Quantities of SNM are grouped into security Categories I, II, III, and IV based on the type, attractiveness level, and quantity of material. This enables DOE to use a cost-effective, graded approach to providing safeguards and security.

In 2008, NNSA completed the removal of Category I/II SNM from SNL/NM. SNL/NM no longer stores or uses Category I/II SNM quantities on an ongoing basis, although it may use such quantities for future activities on a campaign basis. NNSA has begun the removal of Category I/II SNM from LLNL, and plans to complete this activity by 2012. Additionally, as described in Section 3.4.1.4, NNSA would remove Category I/II SNM from LANL if LANL were not selected as a site for either plutonium consolidation or a CNPC/CNC. Removal of Category I/II SNM from LANL would be accomplished by approximately 2022 if plutonium operations are not consolidated at Los Alamos. Additionally, this SPEIS analyzes an alternative that would consolidate Category I/II SNM currently stored at Pantex in Zone 4 to Zone 12 at Pantex.

The alternatives for consolidating Category I/II SNM are described in the sections below. The No Action Alternative (Section 3.7.1) focuses on the Category I/II SNM stored at LLNL and Pantex, as those materials are being considered for transfer (in the case of LLNL) and movement to a new location within the site (in the case of Pantex). The No Action Alternative also describes Category I/II SNM storage at LANL, because LANL would ultimately receive the LLNL Category I/II SNM that is still required for NNSA missions. Because there are no *project-specific* proposals or alternatives to consolidate Category I/II SNM from Y-12, NTS, and SRS, those sites are not addressed in this section; however, Section 5.12 discusses the potential impacts associated with the storage of LLNL Category I/II SNM at NTS, which is being considered as an interim storage location.

As part of the programmatic analysis to decide whether and where to construct a CPC, this SPEIS also assesses the impacts of consolidating Category I/II plutonium from LANL to the CPC site, if Los Alamos is not chosen as the host site for a CPC. That assessment is described in Section 3.4.1.4. Additionally, as part of the programmatic analysis to decide whether and where to construct a CNPC, this SPEIS also assesses the impacts of consolidating Category I/II SNM from LANL, Pantex, and Y-12 to the CNPC site, if any of those sites are not chosen as the host site for the CNPC. That assessment is described in Section 3.5.1.3.

Section 3.7.2 describes the analysis for removing the LLNL Category I/II SNM, which is included in the No Action Alternative. Section 3.7.3 describes the alternative of consolidating

Category I/II SNM currently stored in Zone 4 at Pantex to Zone 12 at Pantex, which could be carried out under any of the programmatic action alternatives. The analysis of the environmental impacts of these alternatives is contained in Section 5.12.

3.7.1 No Action Alternative

3.7.1.1 *Lawrence Livermore National Laboratory*

LLNL uses radioactive materials in a wide variety of operations including scientific and weapons R&D, diagnostic research, and research on the properties of materials. Based on facility design and operation, LLNL establishes administrative limits for fissile, special use, radioactive, and sealed materials. An administrative limit establishes the maximum amount of a particular material that is allowed at a facility. Actual inventories are classified. Non-waste management facilities at LLNL authorized to have Category I/II SNM quantities are Building 332, Building 334, and Building 239. However, only Building 332 stores this material. As such, only Building 332 is discussed below.

The Building 332 Plutonium Facility is part of the Superblock, a protected area located in the southwest quadrant of the Livermore Site (see Figure 3.7-1). This building has a total area of 104,687 square feet, including radioactive materials laboratories, mechanical shops, change rooms, storage vaults, a fan loft, basement, equipment rooms, and offices. There are currently 24 laboratories in which radioactive materials can be handled within the radioactive material areas (RMAs) of the facility (DOE 2005a).

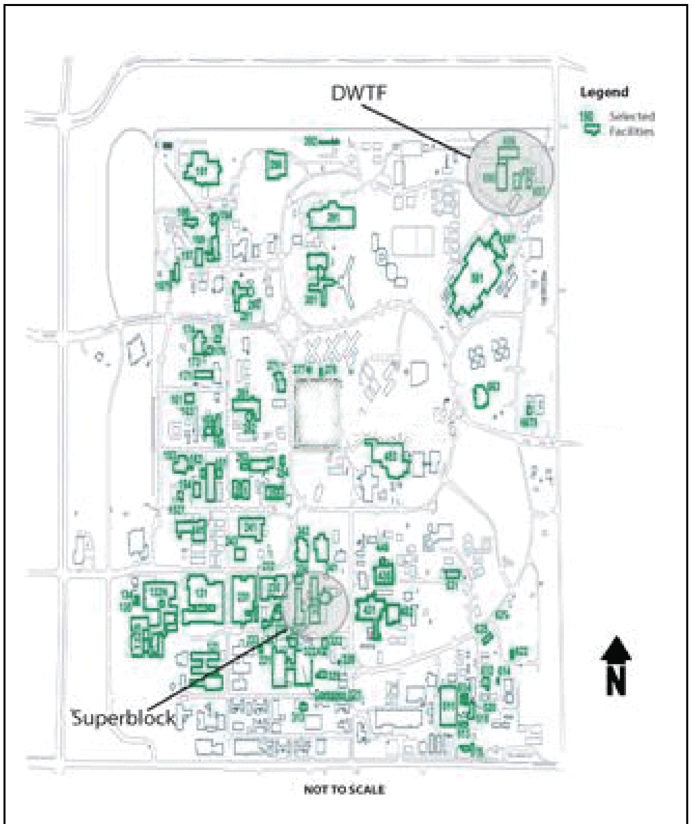


Figure 3.7-1—Location of Superblock (Building 332) and Decontamination and Waste Treatment Facility (DWTF) at LLNL

The mission of Building 332 includes R&D on the physical, chemical, and metallurgical properties of plutonium and uranium isotopes, compounds and alloys. Although the quantities of Category I/II SNM in Building 332 are classified, the administrative limits are as follows:

Plutonium	1,400 kg
Enriched uranium	500 kg

With respect to waste management facilities with Category I/II SNM, the Decontamination and Waste Treatment Facility (DWTF) and Building B625 manage TRU waste that would be shipped to WIPP.

As described in Section 1.5.2.1, DOE has analyzed the transfer of surplus non-pit weapons-usable plutonium materials from LLNL to SRS for consolidated storage.

Those transfers are being accomplished under the No Action Alternative.

3.7.1.2 *Pantex*

As shown on Figure 3.7-2, after removal from nuclear weapons, pits are stored at Pantex. The majority of pits are stored in magazines, commonly referred to as "igloos," in Zone 4. Zone 4 operations include weapon and SNM staging. These storage operations require access control, security, and electricity. The storage area in Zone 4 is approximately 74,200 square feet. In general, these facilities were built in 1949.

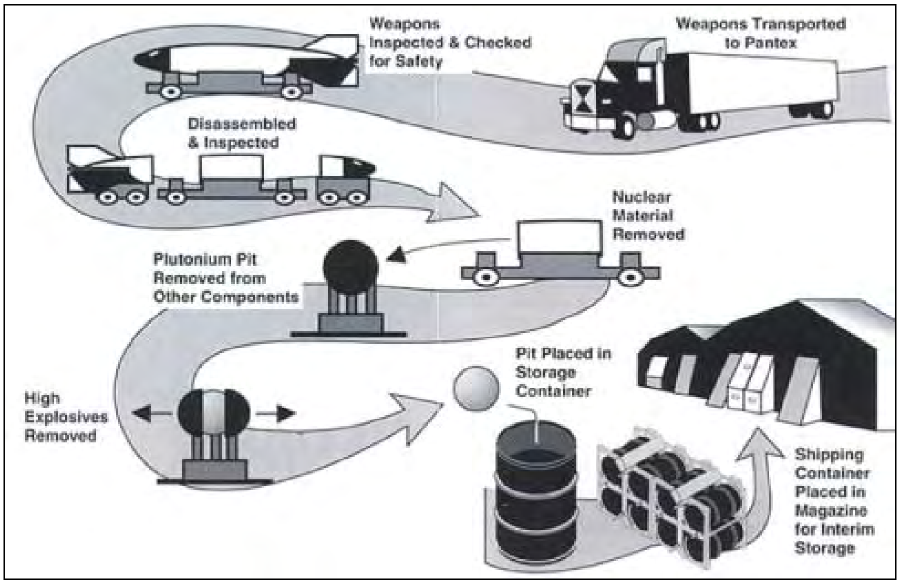


Figure 3.7-2—Pit Storage at Pantex

There are two types of igloos used for pit storage: Modified Richmond and Steel Arch Construction (SAC). Both types are 39 feet deep, 25 feet wide, and a maximum of 15 feet high. Figure 3.7-3 shows a typical igloo. There are more than 10,000 pits in storage at Pantex, the majority of which are destined for processing at the Pit Disassembly and Conversion Facility (PDCF), which is to be constructed at the Savannah River Site. PDCF is currently projected to be operational in 2019.

Figure 3.7-3—Typical Storage Igloos at Pantex

Pits are stored and packaged inside cylindrical containers. The packaging also thermally insulates the pits and makes the problem of cooling more difficult. Currently, pit storage magazines are cooled by natural convection. A draft is created by the heat generated inside the magazine which results in air circulation through intake vents, and out through a ventilation stack. In 1999, Pantex began repackaging pits from AL-R8 containers into AL-R8 Sealed Insert containers to improve storage conditions (see Figure 3.7-4). The repackaging effort started in 1999 is complete. Pit packaging into sealed inserts is a continuing process as pits are removed from weapons as a part of dismantlement.

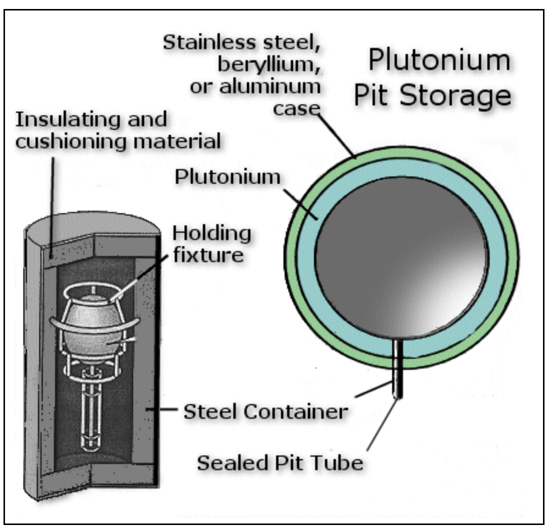


Figure 3.7-4—Simplified illustration of a pit with AL-R8 storage container

3.7.1.3 *Los Alamos National Laboratory*

LANL uses radioactive materials in a wide variety of operations including scientific and weapons R&D, diagnostic research, research on the properties of materials, and plutonium pit production. The TA-55 Plutonium Facility Complex (TA-55 Complex) encompasses about 40 acres and is located about 1 mile southeast of TA-3 (Figure 3.7-5), and is where existing pit production capacity is located. Most of TA-55 is situated inside a restricted area surrounded by a double security fence. The main complex has five connected buildings: the Administration Building, Support Office Building, Support Building, Plutonium Facility, and Warehouse.

The Plutonium Facility, a two-story laboratory of approximately 151,000 square feet, is the major plutonium R&D facility in the complex (see Figure 3.4.1-7), and is where existing pit production capacity is located. The Plutonium Facility provides storage, shipping, and receiving activities for the majority of the LANL SNM inventory (up to approximately 7.3 metric tons), which is mainly plutonium.

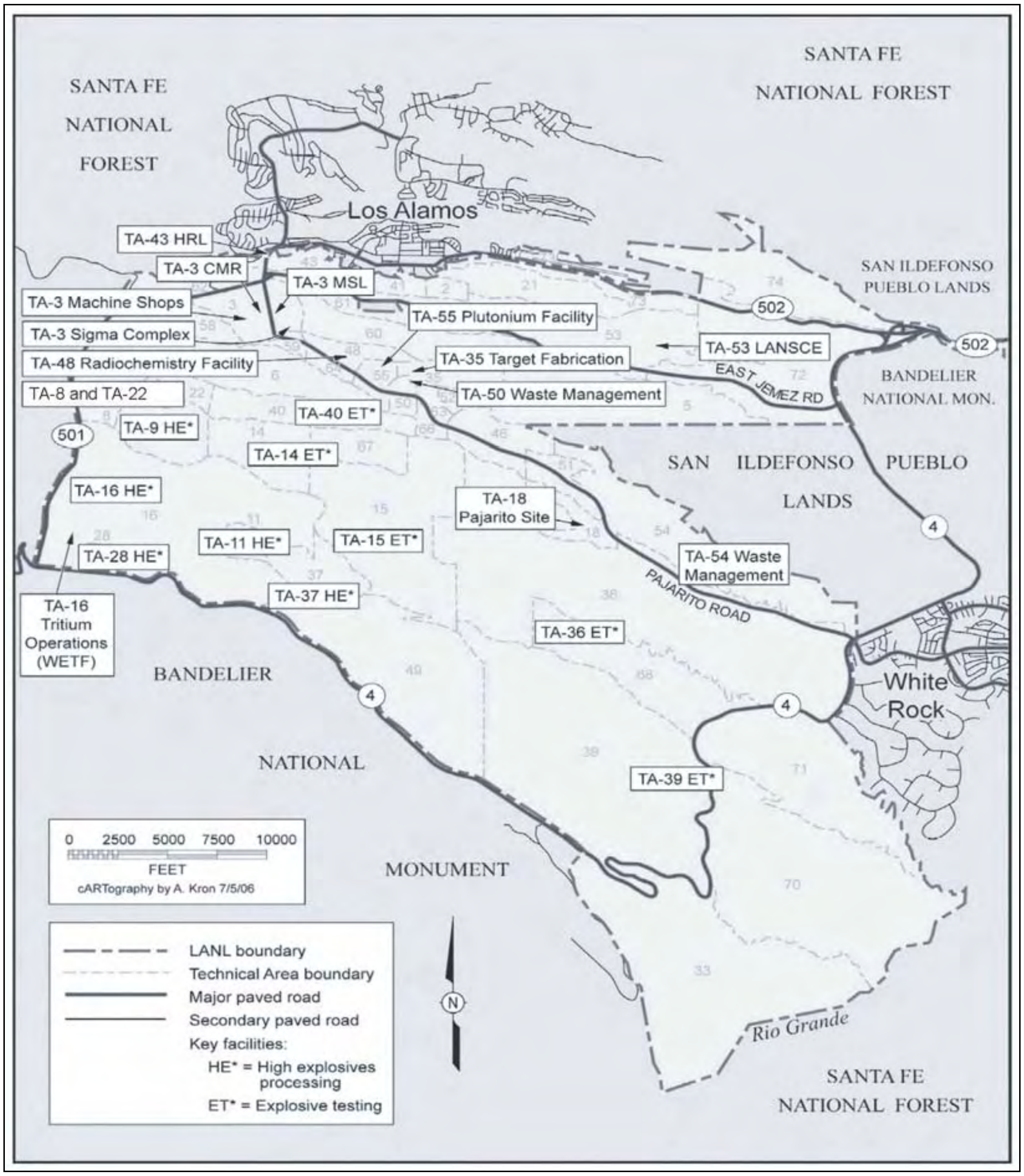


Figure 3.7-5—Major Technical Areas (TAs) at LANL, including TA-55

3.7.2 Transfer Category I/II SNM from LLNL to Other Sites and Phase-out Operations Involving Category I/II quantities of SNM at Superblock

NNSA is planning the removal of Category I/II SNM from LLNL by 2012, and the phase-out of operations at the Superblock involving Category I/II quantities of SNM. Although the exact quantities of Category I/II SNM are classified, the Category I/II SNM at LLNL can be divided up into three basic categories, in the percentages indicated, along with the receiver site for this material, and the number of trips required (see Table 3.7-1).

Table 3.7-1—Category I/II SNM at LLNL

Category I/II SNM Category	Percentage	Receiver Site	# Trips
SNM Excess to Programmatic Missions[29]	56	SRS	10
SNM Required for Programmatic Missions	28	LANL[30]	5
Waste[31]	16	WIPP	3

Source: NNSA 2008.

The LLNL SWEIS (DOE 2005a) assesses the environmental impacts of transporting SNM to and from LLNL and other NNSA sites, SRS, and the WIPP. That analysis includes consideration of transportation actions involving greater quantities of SNM and more shipments than are identified in Table 3.7-1 (see DOE 2005a, Appendix J, Section J.5.3). The Record of Decision for the LLNL SWEIS (70 FR 71491) authorized operations for the Proposed Action Alternative, which allows approximately 538 shipments annually of hazardous and radioactive materials and wastes. As such, the transportation activities identified in Table 3.7-1 are included in the existing No Action Alternative. For completeness, however, this SPEIS assesses the environmental impacts associated with:

- Packaging and Unpackaging Category I/II SNM
- Transporting Category I/II SNM from LLNL to Receiver Sites
- Storage of Category I/II SNM at Receiver Sites
- Phasing out Category I/II SNM Operations from LLNL

With respect to shipments, the maximum number of containers per shipment would be 75, the maximum number of shipments per year would be approximately 4, and all shipments would be made by truck. Shipping is expected to be complete by 2012.

- All oxide and non-weapon component metal would be packaged to meet the DOT 9975 Type B shipping container requirements.
- All weapon components would be packaged to meet DPP-1 Type B shipping container requirements. Mass in containers is dependent on weapon type.
- All Enriched Uranium oxide would be packaged to meet Type B shipping container requirements.
- Enriched Uranium excess metal would be packaged to meet DOT 6M, ES3100, or DPP-2 Type B shipping container requirements.
- All TRU would be shipped in TRUPAC-II containers.
- All TRU shipped to WIPP would meet the WIPP waste acceptance criteria (WAC).

[29] In 2007, DOE prepared a Supplement Analysis (SA) that evaluated the potential environmental impacts of consolidation at SRS of surplus, non-pit, weapons-usable plutonium from Hanford, LLNL and LANL. The SA concluded that this consolidation would not produce a significant change to the potential environmental impacts identified in previous NEPA reviews (DOE 2007b). As a result of this SA, DOE determined that no additional NEPA review is required prior to transferring surplus non-pit weapons-usable plutonium from LLNL to SRS for consolidated storage. Nonetheless, for completeness, this SPEIS includes an analysis of the transportation impacts associated with disposition of all surplus plutonium from LLNL to SRS.

[30] This analysis also evaluates NTS as an interim storage location for the LLNL Category I/II SNM required for programmatic missions. Under this option, the material would be transferred to NTS for interim storage in the DAF until eventual transfer to LANL, or to the site of a CPC or CNPC.

[31] The waste material would be transported to the Idaho National Laboratory (INL) prior to transportation to WIPP. Consequently, this SPEIS includes an analysis of the impacts of transporting this material from LLNL to INL to WIPP.

After phase-out of Category I/II SNM the Superblock facilities would continue to operate with Category III quantities of SNM. During Complex Transformation the Superblock facilities would continue to perform machining, foundry operations, analytical chemistry, and materials characterization on SNM originating from LANL facilities.

3.7.3 Transfer Category I/II SNM from Pantex Zone 4 to Zone 12

Under this alternative, NNSA would transfer pits currently stored at Pantex in Zone 4 to Zone 12. There are two options under this alternative. Under option one, NNSA would transfer all of the more than 10,000 pits stored in Zone 4 to Zone 12. Because there is insufficient storage space in existing Zone 12 facilities, NNSA would need to build a new storage facility capable of storing approximately 60 MT of plutonium. Table 3.7-2 presents the construction requirements for this new underground storage facility. Transfer of the pits from Zone 4 to Zone 12 would enable all Category I/II SNM at Pantex to be consolidated at a central location, close to the assembly, modification, and disassembly operations. This new facility would permit the storage of all surplus and non-surplus pits in Zone 12 in the event there is a delay in the completion of the Pit Disposition and Conversion Facility (PDCF) at SRS. This would reduce the area at Pantex requiring a high level of security. Once this storage facility in Zone 12 is completed and the pits transferred from Zone 4 to Zone 12, Zone 4 would undergo D&D.

Under option two, NNSA would transfer only the non-surplus pits from Zone 4 to Zone 12. The surplus pits would be shipped directly to SRS from Zone 4 for processing in the PDCF, which is currently projected to be operational in 2019. Because there is insufficient storage space in existing Zone 12 facilities for even this reduced quantity, NNSA would need to build a new smaller storage facility to store the non-surplus pits. Table 3.7-2 presents the construction requirements for this new smaller underground storage facility capable of storing approximately 30 MT of plutonium. When the shipment of surplus pits to the PDCF is completed and the non-surplus pits transferred to Zone 12, the area at Pantex requiring a high level of security would be reduced and Zone 4 would undergo D&D.

Under either option, NNSA would ship surplus pits to SRS for disposition at the PDCF in accordance with existing plans, schedules, and decisions made as a part of the Surplus Plutonium Disposition Program. Option 1 would provide the flexibility to store surplus pits in a new storage facility in Zone 12 pending shipment to PDCF while Option 2 would only provide storage for the non-surplus pits in Zone 4. In either case, pit shipment schedules to SRS from Pantex would not be affected.

Table 3.7-2—Construction Requirements for New Zone 12 Pit Storage Facility

Data Required	Maximum Sized Storage Facility Consumption/Use	Minimum-Sized Storage Facility Consumption/Use
Land		
Total Square Footage of New Construction	142,800	95,900
Total Area Disturbed (Facility Footprint) (acres)	57	42
Laydown Area Size (acres)	2.6	2.6
Parking Lots (acres)	1.5	1.5
Water requirement (total construction) (in gallons)	2,950,000	1,500,000
Employment		
Total construction employment (worker years)	480	240
Peak construction employment (workers)	120	60
Construction period (years)	5	5

Source: NNSA 2008

ALTERNATIVES TO RESTRUCTURE R&D AND TESTING FACILITIES

3.8 HIGH EXPLOSIVES R&D

This section describes the alternatives for High Explosives (HE) Research and Development (R&D). The affected environments at sites involved in HE R&D are presented in Sections 4.1 (LANL), 4.2 (LLNL), 4.3 (NTS), 4.5 (Pantex), and 4.6 (SNL/NM). The environmental impacts of the HE R&D alternatives are presented in Section 5.13. Section 3.16 contains a summary of the environmental impacts of the HE R&D alternatives. Together, these sections provide the environmental impact information for the HE R&D alternatives.

Introduction. Energetic materials (high explosives [HE], propellant, and pyrotechnic powders) provide the specific quantities of energy needed for a nuclear weapon to function. Stewardship of the current stockpile and modernization of the weapons in the future require a broad spectrum of energetic material R&D. In the nuclear portion of a weapon system, HE is used for the main charge and associated triggering systems. More specifically, HE R&D is required to assure stability and dependability of HE in nuclear weapons.

Section 3.8.1 describes the No Action Alternative for HE R&D. As described in that section, HE R&D is currently conducted at five sites within the weapons complex. LLNL and LANL are where most of the R&D related to main charge explosives is performed. SNL has responsibility for the cradle-to-grave of the non-nuclear explosive components such as gas generators, ignitors, actuators, and timer-drivers. In addition to extensive manufacturing operations, HE R&D is conducted at the Pantex Plant, principally for safety and quality control purposes and manufacturing process development and improvement. Pantex also partners with the National Labs in conducting HE R&D activities to meet stockpile and other national defense needs. NTS is used for testing of larger quantities of high explosives.

Section 3.8.2 describes the alternatives being considered for HE R&D. Within Section 3.8.2, there are two types of alternatives: Section 3.8.2.1 describes the “Minor”[32] Downsizing/Consolidation Alternatives and Section 3.8.2.2 describes the “Major”[33] Downsizing/Consolidation Alternatives. The analysis of the environmental impacts of these alternatives is contained in Section 5.13.

High Explosives R&D Alternatives
• **No Action.** Continue operations at LLNL, LANL, SNL/NM, NTS, and Pantex • **Minor Consolidation.** Multiple options to consolidate or transfer some operations, but operations would continue at all sites • **Major Consolidation.** Multiple options to consolidate or transfer operations to fewer sites, and discontinue operations at sites that transfer missions

[32] “Minor” alternatives would not completely transfer the HE R&D experimentation and fabrication activities from a site.
[33] “Major” alternatives could completely transfer the HE R&D experimentation and fabrication activities from a site.

3.8.1 Alternative 1—No Action Alternative

This section describes the HE R&D facilities and missions currently conducted at weapons complex sites.

3.8.1.1 *Lawrence Livermore National Laboratory*

HE R&D at LLNL is carried out primarily in two facilities—the High Explosives Application Facility (HEAF) at the main Livermore site, and the Chemistry, Materials and Life Sciences Facility at Site 300. The HEAF is an R&D facility which performs the following missions:

- explosive characterization and lab-scale development;
- performance and safety testing; and
- modeling and simulation of explosive properties and reactions.

The HEAF includes laboratory areas approved for handling explosives in quantities up to 10 kilograms, and office space for the research and support staff. The net usable area of the facility is approximately 65,000 square feet. An aerial view of the HEAF is shown in Figure 3.8-1.

Figure 3.8-1—The LLNL HEAF

Note: The facility section at the bottom of the image is the office area; the area behind that houses the laboratory areas including firing tanks.

The Chemistry, Materials and Life Sciences Facility at Site 300 provides the capability for larger scale synthesis and formulation, HE R&D part fabrication (e.g. pressing, radiography, machining and assembly), and explosives waste packaging, storage and treatment. These capabilities are provided by the Chemistry Area, the Process Area, the Explosive Waste Storage Facility, and the Explosive Waste Treatment Facility. There are approximately 175 scientists, engineers, and technicians associated with the HE R&D mission at LLNL.

The Chemistry Area is made up of the following buildings:

- **B8251**. 2-inch mechanical presses;
- **B826.** Small deaerator/loader;
- **B827 complex.** 50-pound deaerator/loader; heating ovens;
  2-gallon to 5-gallon mixers; melt cast kettles, synthesis pilot plant, slurry kettles, grinders, reaction vessels; and
- **HE storage magazines.** Long term and temporary storage.

The Process Area is made up of the following buildings:

- **B809 complex.** 25-inch isostatic press, drying ovens;

- **B817 complex.** 14- and 18-inch isostatic presses, drying oven;
- **B823 complex.** 9-MeV, 2-MeV, 120-keV radiography of HE R&D parts;
- **B806 complex.**
- **B807.** Machining of HE R&D parts;
- **B855 complex.** Large HE part machining;
- **B810 complex.** Assembly of HE R&D parts;
- **B805.** General machine shop, explosives waste packaging; and
- **HE storage magazines.** Long term and temporary storage.

The Explosives Waste Storage Facility contains 5 HE storage magazines. The Explosives Waste Treatment Facility has a State of California permit for Open Burn/Open Detonation of explosives waste.

Apart from the alternatives analyzed in this SPEIS, LLNL is seeking a permit that would allow larger open-air detonation experiments at Site 300. If granted, the permit would govern all open-air explosives activities that are currently performed under an exemption to permitting in the San Joaquin Valley Air Pollution Control District's Rule 2020. Much of this work would support activities of the Departments of Defense and Homeland Security.

The permit would allow larger open-air detonations and activities (up to 350 pounds net explosives weight) that could include:

- evaluation the effectiveness of countermeasures to potential terrorist devices and actions;
- training on countermeasures for other government agencies;
- study of explosively-driven electro-magnetic pulse generators;
- development of effective conventional (non-nuclear) munitions for use by the Department of Defense such as enhanced-effects and low-collateral damage explosives and devices;
- study of blast effects damage to structures and equipment from accidental and deliberate explosions;
- measurement of explosives shock, directional effects, heat transfer and fragmentation within and near explosive devices;
- development of explosives containment/confinement vessels;
- equipment testing such as explosives shipping containers;
- study of the explosives dispersal of surrogates for hazardous materials; and
- studies of the explosives reaction rates.

The permit application contains specific limits on metals that are hazardous air pollutants (HAPs). Currently, LLNL performs outdoor detonation experiments that produce HAPs emissions below that allowed under the exemptions. If the permit were granted, beryllium (used extensively in outdoor experiments from the late 1950's to 2002) would no longer be allowed in outdoor experiments.

3.8.1.2 *Los Alamos National Laboratory*

LANL conducts HE R&D activities in nine technical areas (TAs), as discussed below. While the LANL HE R&D facilities share some common spaces with the hydrodynamic program, this SPEIS focuses on HE R&D activities at LANL in three areas (HE Science, HE Fabrication, and HE Firing Sites), with 31 buildings (each >1000 square feet), which includes magazines and firing points. The major TAs with HE R&D facilities are discussed below and shown on Figure 3.7-5.

TA-9 This TA is located on the western edge of LANL. Fabrication feasibility and the physical properties of explosives are explored at this site, and new organic compounds are investigated for possible use as explosives. Storage and stability problems are also studied.

TA-14 Located in the northwestern part of LANL, this TA is one of fourteen firing areas. Most operations are remotely controlled and involve detonations, certain types of high explosives machining, and permitted burning. This site is currently permitted to treat waste through open detonation or open burning under the RCRA.

TA-16 Fabrication of precision explosive assemblies, from powder pressing to machining and inspection, occurs at TA-16 to support HE R&D experimentation.

TA-22 This TA, located in the northwestern portion of LANL, houses the Los Alamos Detonator Facility. Construction of a new Detonator Production Facility began in 2003. Research, development, and fabrication of high-energy detonators and related devices are conducted at this facility.

TA-36 TA-36 is in a remotely located area in the eastern portion of LANL that is fenced and patrolled. It has two active firing sites that support the HE R&D mission (it has two other firing sites that support the hydrotesting mission). The sites are used for a wide variety of non-nuclear ordnance tests.

TA-39 TA-39 is located at the bottom of Ancho Canyon. The behavior of non-nuclear weapons is studied here, primarily by photographic techniques.

TA-40 TA-40, centrally located within LANL, is used for studies of explosive initiation, detonation, and shock wave response of other materials related to weapon systems. In addition, surveillance and qualification studies of War Reserve (WR) detonators are conducted.

TA-46 TA-46, located between Pajarito Road and the San Ildefonso Pueblo, is one of LANL's basic research sites. Current operations include studies of the response of small quantities of explosive to thermal and mechanical stimuli.

TA 53 At TA-53, LANL has developed Proton Radiography, which has the ability to capture a sequence of images, creating a movie of an explosive event (up to 33 frames, currently). Proton radiography shots are currently limited to 10 pounds TNT equivalent in a containment vessel.

Reductions in HE activities have been previously analyzed at LANL in the *Environmental Assessment for the Proposed Consolidation of Certain Dynamic Experimentation (DX) Division Activities at the Two Mile Mesa Complex of LANL* (hereafter, LANL DX Consolidation Plan) (LANL 2003). Based on that Environmental Assessment and FONSI, LANL is reducing the footprint of HE and is transforming from open-air to contained firing for most experiments under 10 kg TNT equivalent. LANL consolidation is underway, as exhibited by closure of Buildings TA-16-340, TA-16-430 with consolidation into TA-16-260, closure of the TA-40-4 firing site, D&D of TA-9-35 and TA-9-42, and the transfer of TA-39-2 to Threat Reduction Directorate.

3.8.1.3 *Pantex Plant*

Research at Pantex includes studying the use of insensitive HE for increased safety as well as refinement of HE manufacturing methods and safety procedures. Pantex performs HE synthesis, formulation, machining, extrusion, testing, process development, and analytical operations in performing its HE research and development and production missions. These operations are performed in Zone 11 or Zone 12 using HE materials stored in Zone 4 East remote firing sites (see Figure 3.8-2). HE R&D activities and HE production mission work at Pantex both occur in common facilities and work areas.

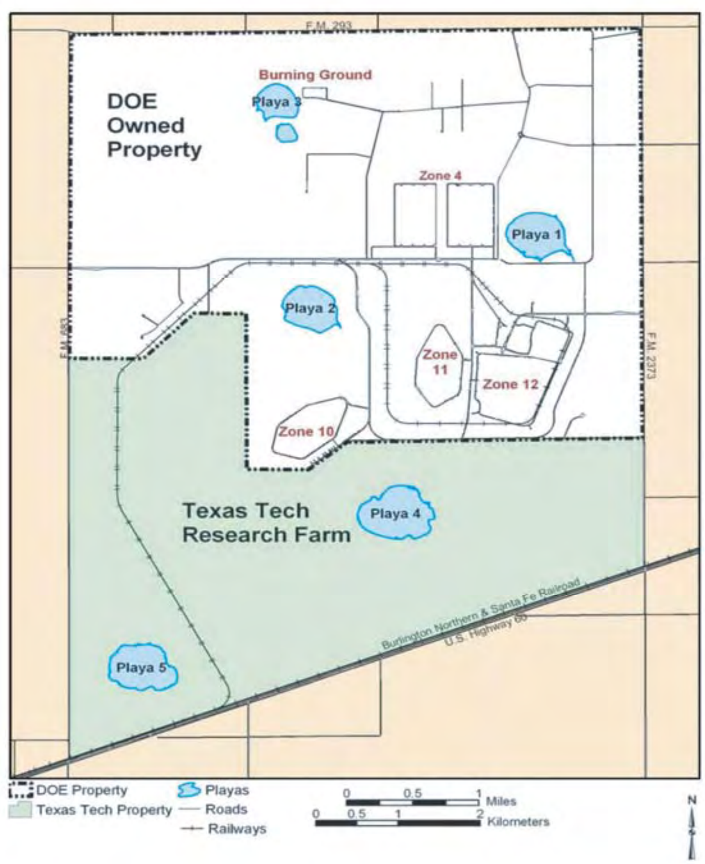


Figure 3.8-2—Relevant Zones at Pantex for HE R&D

3.8.1.4 *Sandia National Laboratories/NM*

Figure 3.8-3—Explosive Component Facility (ECF); SNL/NM Bldg 905

The major SNL/NM facilities and laboratories involved in NNSA activities that conduct HE R&D are described below. The Explosive Component Facility (ECF), shown in Figure 3.8-3, was built specifically to conduct the SNL/NM work on explosive components. The ECF includes over 100,000 square feet of laboratories, diagnostic centers and performance facilities for the research and development of advanced explosive technology and sits on 22 acres in Tech Area II (see Figure 3.8-4). Unique facility features include explosives labs qualified for all types of explosives, HE chambers and firing pads, explosive component disassembly area, explosives receiving area, and explosives storage. The ECF includes the ability to handle, store, test and model all types of explosive materials, conduct performance testing and material compatibility studies, and surety assessments related to safety and reliability. Approximately 80 people work at the ECF.

The Terminal Ballistics Facility (TBF), located in TA-III, includes a 1,000 square-foot indoor and a 100-acre outdoor firing range that accommodate testing and firing of guns ranging in size from 0.17 caliber to 8-inch. The facility retains the world's fastest launch capability for masses of 300 to 2,000 grams. The site also conducts static firings of solid fuel rocket motors of up to 100,000 pounds thrust. The firing site can accommodate explosive detonation tests up to the equivalent of 50 pounds of TNT. As many as 12 people work at the TBF, depending upon the test being conducted.

Currently there are two facilities used for explosive storage: the “6000 Igloos” and Manzano. They are owned by Kirtland AFB. The 6000 Igloo storage area has a total of 21,000 square feet in 21 facilities (10 of 21 are for classified storage). The Manzano storage area includes 43 facilities, of which 13 are used for explosive storage. Approximately 18 people maintain the storage facilities.

The Explosives Applications Department utilizes facilities in Sites 9930, 9939, 9920 in Coyote Canyon to conduct research, design, development, manufacture and testing of explosive components, explosive systems, and arming and firing system hardware. The department also operates laboratories in Tech Area IV and the Explosives Applications Laboratory (Site 9930) in Coyote Canyon. Approximately 36 people support this mission.

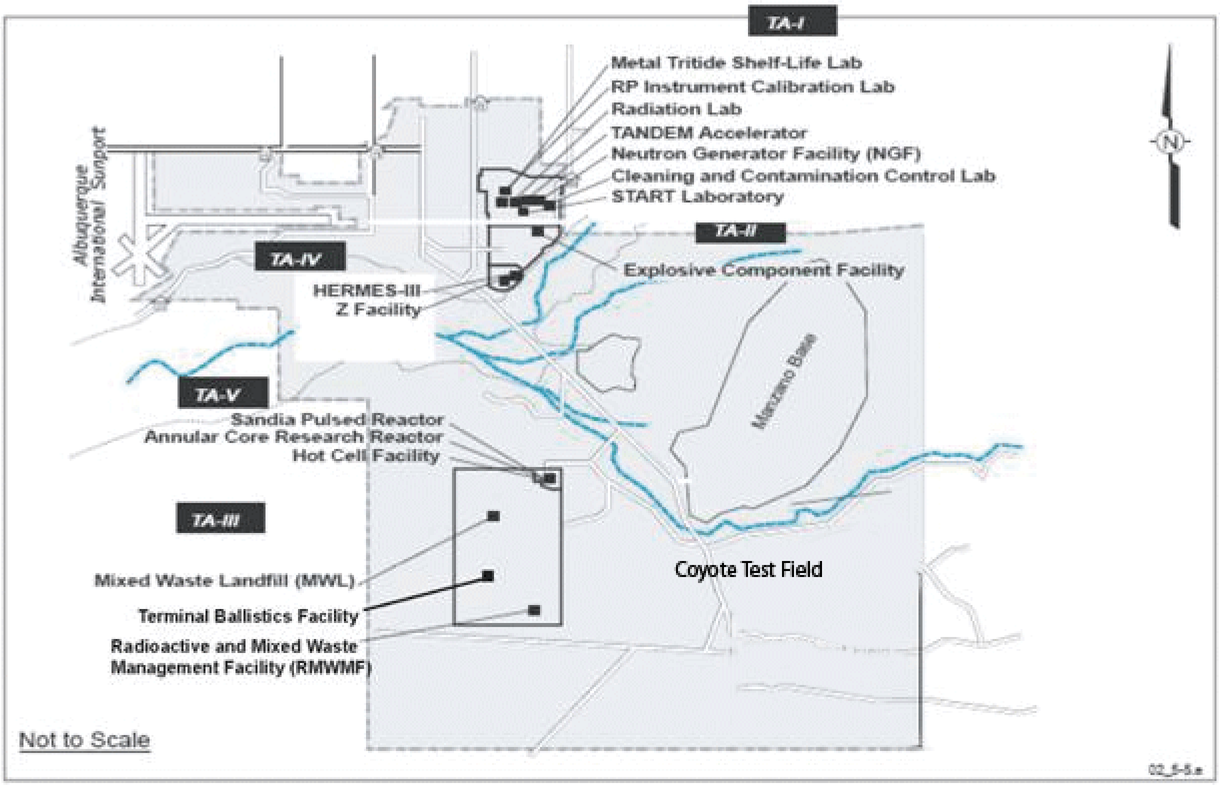


Figure 3.8-4—SNL/NM Technical Areas

3.8.1.5 *NTS*

NTS facilities for HE R&D also support hydrotesting. Section 3.11.1.3 discusses these facilities.

3.8.2 HE R&D SPEIS Alternatives

As explained in Section 3.8.1, HE R&D activity is currently distributed among five primary sites within the nuclear weapons complex based on their respective roles in support of the nuclear weapons stockpile. This SPEIS analyzes a full spectrum of alternatives associated with HE R&D as shown on Table 3.8-1. Each of these alternatives is described in this section.

3.8.2.1 *HE R&D Minor Reduction/Consolidation Alternatives*

Alternatives 2a–2e would reduce or consolidate various functions related to HE R&D, but not transfer the entire HE R&D mission from one site to another site. Each alternative is described below:

Table 3.8-1—HE R&D Alternatives

Downsize/Consolidate Alternatives		Donor Site	Receiver Site
1	No Action Alternative	N/A	N/A
2a	Downsize in Place	N/A	N/A
2b	Relocate HE Processing & Fabrication from Site 300	LLNL	Pantex, LANL
2b’	LLNL HEAF Annex for local part fabrication	LLNL	Pantex, HEAF, LANL, Private industry
2c	Consolidate open-air 1-10 kg HE R&D experiments from LANL and SNL/NM to HEAF; and over 10 kg-100 kg HE R&D experiments at LANL or NTS	1-10 kg HE R&D LANL, SNL/NM, Pantex 10-100 kg HE R&D LLNL, SNL/NM	1-10 kg HE R&D LLNL, NTS 10-100 kg HE R&D LANL or NTS
2d	Consolidate unconfined firing to one or no sites	ALL	One Site or No Site
2e	Consolidate Main Charge HE R&D Experiments and Testing to one or both nuclear labs	SNL/NM	LANL, LLNL
3a	Consolidate HE R&D Experimentation and Fabrication Activities to LANL	SNL/NM, LLNL, Pantex	LANL
3b	Consolidate HE R&D Experimentation and Fabrication Activities to LLNL	SNL/NM, LANL, Pantex	LLNL
3c	Consolidate HE R&D Experimentation and Fabrication Activities to Pantex	SNL/NM, LANL, LLNL	Pantex
3d	Consolidate HE R&D Experimentation and Fabrication Activities to SNL/NM	LANL, LLNL, Pantex	SNL/NM
3e	Consolidate HE R&D Experimentation and Fabrication Activities from LANL to LLNL or Pantex or NTS	LANL	LLNL, Pantex, NTS
3f	Consolidate HE R&D Experimentation and Fabrication Activities from LLNL to LANL or Pantex or NTS	LLNL	LANL, Pantex, NTS
3g	Consolidate HE R&D Experimentation and Fabrication Activities from LANL and LLNL to Pantex or NTS	LANL, LLNL	Pantex, NTS
3h	Consolidate HE R&D Experimentation and Fabrication Activities to NTS	LANL, LLNL, SNL/NM, Pantex	NTS

3.8.2.1.1 Alternative 2a—Downsize in place

Under this alternative, the following actions would take place:

At LLNL, B825/B826, B817, and some machining bays in B806/B807 would close. No construction would be required for this alternative, however, B825 and B826 would be decommissioned. There would be no staffing change for this alternative (175 scientists, engineers, and technicians) and no significant change in effluents, emissions, or waste compared to the No Action Alternative. As some buildings close, work would transfer to existing buildings.

As discussed in Section 3.8.1.2, LANL is reducing the footprint of HE and is transforming from open-air to contained firing for most experiments under 10 kg TNT equivalent. However, under option 2a, additional reductions at LANL would occur to the HE R&D capability as part of Complex Transformation. This reduction could include establishing a smaller footprint with fewer contained firing chambers, than identified in the LANL DX Consolidation Plan. These actions, however, would be bounded by previous plans and would have no different environmental impacts.

At SNL/NM, the DP-related explosives R&D work substantially decreased its footprint in 1995 when the ECF (Bldg 905) was built. The footprint for the DOE explosive work decreased from 210 to 22 acres in this consolidation event, and the lab and office space decreased from a total of 110,000 square feet, over a dozen buildings (offices, labs and storage) to approximately 100,000 square feet now located one building—the ECF. Currently all the facilities that house explosives-related R&D are functioning close to full capacity or are unique to the function that they perform. SNL/NM's 9920, 9930, 9939, 9940 sites and Thunder Range are being used to full capacity. As such, no additional reductions are proposed under this alternative. No changes would occur at Pantex or NTS.

3.8.2.1.2 Alternative 2b—Relocate HE Processing & Fabrication from Site 300

Under this alternative, NNSA would discontinue HE processing and fabrication at Site 300. The activities and configuration of the HEAF, as described in the No Action Alternative, would remain unchanged. However, the HE R&D facilities at Site 300 would be closed, and HE R&D parts that are currently fabricated at Pantex or LANL would be shipped to LLNL for testing in HEAF.[34] The facilities at Site 300 that would close under this alternative are: B825, B826, B827 Complex, B809 Complex, B817 Complex, B823 Complex, B806 Complex, B807, B855 Complex, B810 Complex, and B805. No construction at LLNL, LANL, or Pantex would be required for this alternative.

3.8.2.1.3 Alternative 2b'—Construct HEAF Annex at LLNL for Local Part Fabrication

Under this alternative, NNSA would implement alternative 2b, construct an annex to HEAF for local fabrication of HE R&D parts. The annex would be constructed adjacent to HEAF's explosive processing cells and support areas (e.g. control room, explosive storage) to provide fabrication capability that is currently provided at Site 300. Construction information for this annex is presented in Section 5.13.1.3.

3.8.2.1.4 Alternative 2c—Move Open-Air Experiments Using 1–10 kg HE from LANL and SNL/NM to LLNL HEAF and Experiments Using 10–100 kg HE to LANL or NTS

Under this alternative, NNSA would consolidate open-air 1-10 kilograms HE from LANL and SNL/NM to LLNL[35] HEAF and consolidate experiments using more than 10 kilograms up to 100 kilograms at LANL or NTS. There would be no new construction at LANL.

At LLNL, available office space near HEAF would provide temporary office/work space for LANL or SNL/NM staff while they are at LLNL. To accommodate the higher firing load at HEAF, more LLNL staff would be required in addition to the staff that LANL and SNL/NM

[34] This alternative could only be implemented if other activities at Site 300 that require a HE processing and fabrication infrastructure, specifically hydrotesting at the Contained Firing Facility (see Section 3.11.2.2) and system environmental testing at the Environmental Test Facility (see Section 3.12.3), are transferred to new facilities, freeing space for this testing to occur.
[35] Processing capability could handle up to 15 kg, but testing would be less than 10 kg.

would rotate in for their experiments. It is assumed in this alternative that alternatives 2b and 2b' are not adopted.[36] No new facilities would be required for this alternative.

At SNL/NM, the maximum shot size at the ECF is 1 kilogram of TNT equivalence. As a result, this alternative would not eliminate HE R&D experiments and testing that are conducted at the ECF, nor would it decrease the laboratory space required to do this work. The work at the TBF is also not likely to experience major impacts in this alternative. The SNL/NM firing sites most likely affected by this alternative would be 9920, 9930, 9939, 9940 and Thunder Range, which are mostly used and funded by work for other agencies.

At LANL, consolidation of open-air 1-10 kilograms shots at HEAF with simultaneous consolidation of 10-100 kg shots at LANL would be expected to have no significant net effect on operations. Consolidation of 1-10 kilograms shots to HEAF would result in the transfer of the firing and assembly of approximately 200-250 shots per year. At LANL, conducting the 10-100 kilogram shots would impact the planned reductions/closure of LANL's firing points in order to perform these additional tests. This would include receiving shots from LLNL's 850 and 851, SNL/NM's 9920, 9930, 9939, 9940, Thunder Range, and surveillance and destructive testing from Pantex. This is in contrast to the LANL downsizing that is occurring under the No Action Alternative, as firing points are being replaced with containment vessels. However, given LANL's current permitted status, this work could be accepted without additional environmental impacts.

NTS does not currently have an independent HE R&D program, but utilizes specific capabilities at various facilities to conduct high explosive activities. These facilities include the BEEF, Baker site, U1a Complex, and the tunnels U12P and U25X, as well as the Nonproliferation Test and Evaluation Complex (NPTEC). Each site is suitable and has the capabilities necessary to conduct HE R&D experiments up to approximately 100 kilograms using hazardous materials.

NTS's primary open air firing site is the BEEF complex. The facility contains one instrumented shot table, a control/diagnostic bunker, and a high speed camera bunker. Surrounding the 60 ft x 60 feet shot table are three steel diagnostic blast enclosures. A shot rate of greater than one shot per day could likely be accommodated in existing firing tables.

3.8.2.1.5 Alternative 2d—Consolidate Unconfined Firing to One Site or Eliminate It

Under this alternative, all unconfined firing operations would be consolidated at one site or eliminated. In any case, unconfined firing operations would be eliminated at LLNL. Currently, HE R&D unconfined firing at LLNL is limited to destruction of excess explosive parts and explosives waste, through open burn or open detonation (OB/OD) at the Explosives Waste Treatment Facility located at Site 300. No new facilities are required in this alternative. At LLNL, Building 845 would be decommissioned.

LANL currently operates an Emergency Management and Response (EM&R) site that includes open detonation of suspect/terrorist threat devices for the Laboratory and the County of Los Alamos. This site is a destruct site that will always require some outdoor capability (for example

[36] This alternative is not possible if either alternative 2b or 2b' is implemented.

destruction of a "car bomb"; this could be characterized as an emergency). In addition, LANL uses the existing OB/OD permit to eliminate “Class L” explosives and to sanitize classified remains of hydrodynamic experiments. OB/OD is a separately permitted function that does not allow dual use of facilities. For example, a contained firing vessel for programmatic testing may not also be used as a waste treatment facility, unless permitted. Replacement of all OB/OD requires either additional construction or modification of an existing facility to develop a separately permitted contained destruct capability (e.g. incineration, super critical water oxidation, base hydrolysis or molten salt reactors). Construction of a 2000-square foot facility would be worst case, and would fall within the bounding condition set by the DX Consolidation Plan which is covered under the No Action Alternative.

Receiving all unconfined firing would force limited closure of LANL’s firing points in order to meet the needs of these demands. This would include receiving shots from LLNL’s 850 and 851, SNL/NM’s 9920, 9930, 9939, 9940, Thunder Range, and surveillance and destructive testing from Pantex.

The NTS Area 11 Explosive Ordinance Disposal Unit (EODU) is used to conduct open detonations for the destruction of excess explosive materials in accordance with appropriate RCRA permits. . An area near tunnel U25X has a firing site that was used for HE experiments containing beryllium. No additional facilities are required.

3.8.2.1.6 Alternative 2e—Consolidate Main Charge HE R&D Experiments and Testing at One or Both Nuclear Labs

In this alternative, main charge HE R&D experiments at SNL/NM would be transferred to LANL and/or LLNL. Pantex main charge experiments are considered part of production plant support, or surveillance, and not HE R&D, and are therefore not in the scope of this alternative.

If the SNL/NM experiments were transferred to LLNL, they could be accommodated in existing laboratories in HEAF. The main charge HE R&D effort is small at SNL/NM, so there is a negligible impact on current HEAF activities. No construction or new facilities are required for this alternative.

If the SNL/NM experiments were transferred to LANL, LANL has the current infrastructure to absorb main charge HE R&D experiments and testing that SNL/NM is currently conducting at its site, with minimal or no impact. No new facilities are required in this alternative.

If SNL/NM had LLNL or LANL conduct its experiments instead, this would not decrease the need for supporting work at SNL/NM. SNL/NM would design components and experiments up to the point of HE assembly at SNL/NM. SNL/NM also has components that utilize secondary HE, which is the same family of explosives as the main charge explosives. SNL uses these same capabilities for the explosive materials in the non-nuclear components. If work on the main charge explosives ceased at SNL/NM, work would continue on the other explosive materials that are in the non-nuclear components. No change in personnel would occur and there would be no net reduction in facility footprints. Consolidation to one or both nuclear laboratories would reduce costs associated with maintenance of duplicative facilities.

3.8.2.2 *HE R&D Major Reduction/Consolidation Alternatives*

Alternatives 3a–3g would transfer the entire HE R&D experimental and fabrication activities from one site to one or more other sites. It is noted that the R&D *mission* that has been assigned to each laboratory and plant would continue to be conducted by the scientists and engineers at those sites, although they may have to travel to a "user facility" at the consolidation site. It is the *capability*; i.e. facilities, machines, and equipment, that would be consolidated at a single site or smaller number of sites. Some personnel (facility operating staff and technicians) might move with the capability to the consolidation site. Each alternative is described below.

3.8.2.2.1 Alternative 3a—Consolidate HE R&D Experimentation and Fabrication Activities at LANL

Under this alternative, HE R&D experimentation and fabrication activities would be consolidated at LANL. The following actions at the potentially affected sites would occur:

LANL. Consolidating HE R&D at LANL would involve an increase of capacity for the types of experiments and capabilities that currently exist at LANL. LANL would need approximately 170,000 square feet of office and laboratory space to absorb the LLNL and SNL/NM experimental and fabrication activities. Figure 3.8-5 shows the proposed location for this new facility. No additional construction would be needed to absorb the Pantex HE R&D experimentation and fabrication activities.

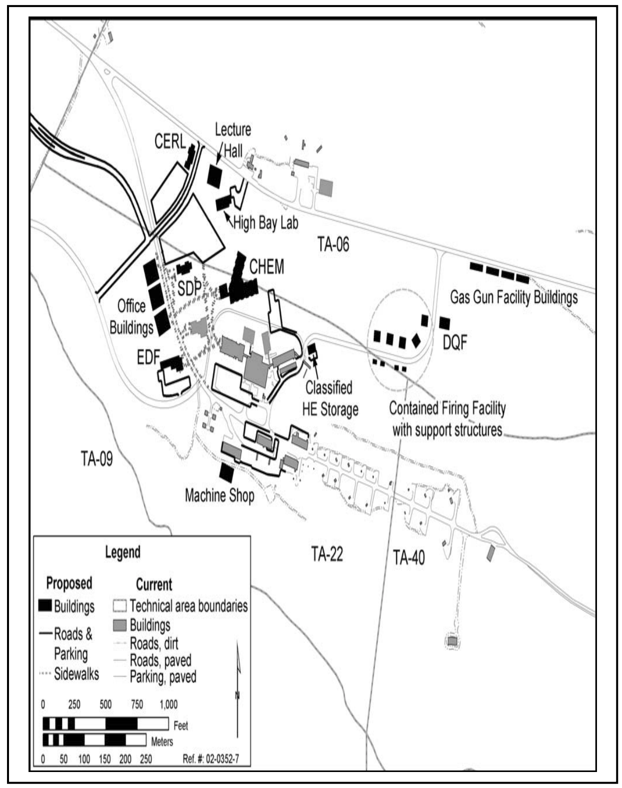


Figure 3.8-5—New Construction Location for LANL Consolidation Alternative

LLNL. Under this alternative, LLNL would cease HE R&D experimentation and fabrication.

SNL/NM. Under this alternative, SNL/NM would cease HE R&D experimentation and fabrication.

Pantex. Under this alternative, Pantex would cease HE R&D experimentation and fabrication. However, because there are currently no Pantex facilities or personnel dedicated entirely to HE R&D experimentation and fabrication, no major changes in facility operations would result.

3.8.2.2.2 Alternative 3b—Consolidate HE R&D Experimentation and Fabrication Activities at LLNL

Under this alternative, HE R&D experimentation and fabrication would be consolidated at LLNL. The following actions would occur:

LLNL. Construction of a new facility at LLNL would be necessary to provide capacity.[37] A new experimental facility with about 400,000 square feet and 300 offices is projected. The new facility would be located near HEAF, as shown below in Figure 3.8-6.

LANL. Under this alternative, LANL would cease HE R&D experimentation and fabrication.

SNL/NM. Under this alternative, SNL/NM would cease HE R&D experimentation and fabrication.

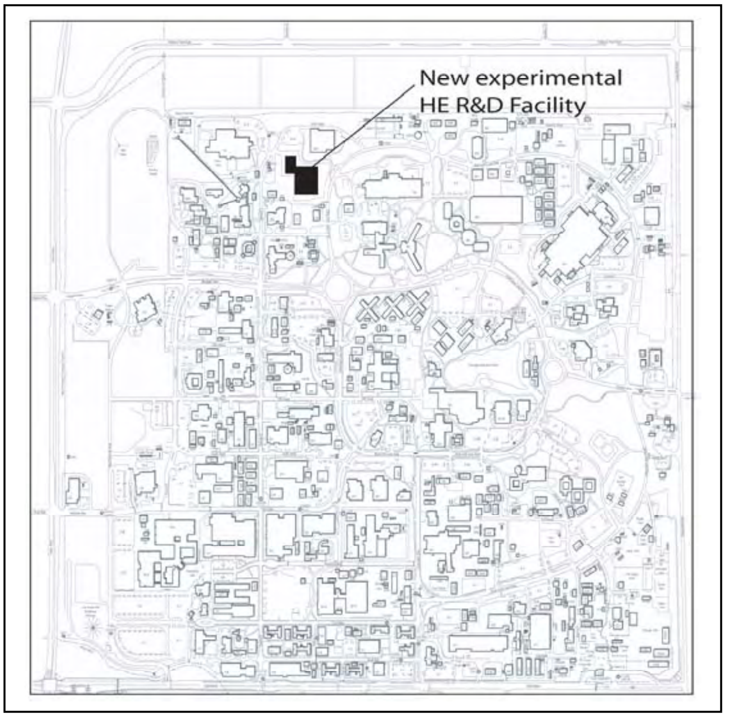


Figure 3.8-6—Location for New HE R&D Facility at LLNL

Pantex. Under this alternative, Pantex would cease HE R&D experimentation and fabrication. However, because there are currently no facilities or personnel dedicated entirely to HE R&D experimentation and fabrication at Pantex, no major changes in facility operations would result.

3.8.2.2.3 Alternative 3c—Consolidate HE R&D experimentation and fabrication activities at Pantex

Under this alternative, HE R&D experimentation and fabrication activities would be consolidated at Pantex. The following actions would occur:

Pantex. Consolidating HE R&D experimentation and fabrication activities at Pantex would result in the need for both new construction and modifications to existing facilities. Pantex would need approximately 100,000 square feet of office and laboratory space to absorb the LLNL, LANL, and SNL/NM HE R&D experimental and fabrication activities.

LANL. Under this alternative, LANL would cease HE R&D experimentation and fabrication.

LLNL. Under this alternative, LLNL would cease HE R&D experimentation and fabrication.

[37] For this alternative, HE R&D at Site 300 would have to continue – alternatives 2b or 2b' could also be adopted.

SNL/NM. Under this alternative, SNL/NM would cease HE R&D experimentation and fabrication.

3.8.2.2.4 Alternative 3d—Consolidate HE R&D experimentation and fabrication activities at SNL/NM

Under this alternative, HE R&D experimentation and fabrication would be consolidated to SNL/NM. The following actions would occur:

SNL/NM. SNL/NM could conduct the HE R&D experimentation and fabrication activities currently performed at Pantex and activities from LANL and LLNL conducted at outdoor firing sites without additional construction. In order to transfer operations from the LLNL HEAF, Site 300, and LANL, an additional 480,000 square feet of office and laboratory space would be required. The construction would likely be located in TA-2, near the ECF shown on Figure 3.8-4.

No construction would be required to accommodate the work that is currently conducted at Pantex. New firing sites would not be required. About half of the new construction represents office space for traveling scientists and engineers, and the remainder as laboratory space.

LANL. Under this alternative, LANL would cease HE R&D experimentation and fabrication.

LLNL. Under this alternative, LLNL would cease HE R&D experimentation and fabrication.

Pantex. Under this alternative, Pantex would cease HE R&D experimentation and fabrication. However, because there are currently no facilities or personnel dedicated entirely to HE R&D experimentation and fabrication, no major changes in facility operation would result.

3.8.2.2.5 Alternative 3e—Move HE R&D Experimentation and Fabrication Activities from LANL to LLNL, Pantex or NTS (for NTS, see Section 3.8.2.2.8)

Under this alternative, HE R&D experimentation and fabrication activities would be transferred from LANL to either LLNL or Pantex. The following actions would occur:

LANL. Under this alternative, LANL would cease HE R&D experimentation and fabrication.

LLNL (if receiver). Construction of a new facility at LLNL would be necessary to provide capacity. The facility would be similar to the facility identified under alternative 3b.

Pantex (if receiver). Construction of a new facility and modifications to existing facilities would be necessary to support the HE R&D capacity from LANL. The facility would be similar to the facility identified under alternative 3c.

3.8.2.2.6 Alternative 3f—Move HE R&D Experimentation and Fabrication Activities at LLNL to LANL, Pantex, or NTS (for NTS, see Section 3.8.2.2.8)

Under this alternative, HE R&D experimentation and fabrication would be transferred from LLNL to either LANL or Pantex. The following actions would occur:

LANL. Consolidating the LLNL HE R&D experimentation and fabrication at LANL would involve an increase of capacity for the types of experiments and capabilities that currently exist at LANL. LANL would need approximately 65,000 square feet of office and laboratory space to absorb the LLNL experimentation and fabrication activities.

LLNL. Under this alternative, LLNL would cease HE R&D experimentation and fabrication.

Pantex (if receiver). Construction of a new facility and modifications to existing facilities at Pantex (similar to those identified under Alternative 3c) would be necessary to support the HE R&D experimentation and fabrication capacity from LLNL.

3.8.2.2.7 Alternative 3g—Move HE R&D Experimentation and Fabrication Activities from LANL and LLNL to Pantex or NTS (for NTS, see Section 3.8.2.2.8)

Under this alternative, HE R&D experimentation and fabrication activities would be transferred from LLNL and LANL to Pantex. The following actions would occur:

Pantex (if receiver). Consolidating HE R&D experimentation and fabrication at Pantex would result in the need for both new construction and modifications to existing facilities. The facility and modifications would be similar to those identified under alternative 3c.

LANL. Under this alternative, LANL would cease HE R&D experimentation and fabrication.

LLNL. Under this alternative, LLNL would cease HE R&D experimentation and fabrication.

3.8.2.2.8 Alternative 3h—Move HE R&D Experimentation and Fabrication Activities to NTS

Under the major HE R&D consolidation alternatives, NTS is being considered for the following: (1) consolidation of LANL HE R&D experimentation and fabrication to NTS; (2) consolidation of LLNL HE R&D experimentation and fabrication to NTS; (3) consolidation of LANL and LLNL HE R&D experimentation and fabrication to NTS; and (4) consolidation of all HE R&D experimentation and fabrication at NTS.

To consolidate HE R&D experimentation and fabrication activities to the NTS would require a 100,000 square feet Explosive Components type facility to conduct SNL/NM activities. An additional 200,000 square feet of mix use space would be required for HE R&D activities currently being conducted at LANL, LLNL, and Pantex.

3.9 TRITIUM R&D

This section describes the alternatives for Tritium Research and Development (R&D). The affected environments at sites involved in Tritium R&D are presented in Sections 4.1 (LANL), 4.2 (LLNL), and 4.8 (SRS). The environmental impacts of the Tritium R&D alternatives are presented in Section 5.14. Section 3.16 contains a summary of the environmental impacts of the Tritium R&D alternatives. Together, these sections provide the environmental impact information for the Tritium R&D alternatives.

Introduction. Tritium, a radioactive isotope of hydrogen, is an essential component of every warhead in the nuclear weapons stockpile. Tritium is used to boost the yield of warheads. Tritium has a half-life of about 12 years, so replacement tritium must be produced in reactors, purified, and put into storage vessels (reservoirs). Because warheads depend on tritium to perform as designed, there is a need for tritium R&D. Tritium R&D involves activities such as: storage, purification, separation, engineering and physics performance, aging, analysis of surveillance data, diagnostics, enhanced surveillance, modeling and simulation, and compatibility testing.

Over the past fifteen years there has been substantial consolidation of tritium activities. Today, the NNSA tritium mission includes several basic elements: irradiation of tritium targets, tritium extraction, tritium recycle and reservoir fill, Gas Transfer System (GTS) surveillance, design support, and R&D. For ease of discussion, the irradiation of tritium targets, tritium extraction, recycle and reservoir fill, and GTS surveillance are referred to as “Tritium Production”, and the design support and tritium R&D as “Tritium R&D.” With the exception of the irradiation of tritium targets (which occurs at the TVA Watts Bar commercial nuclear reactor), all other elements of “Tritium Production” are currently conducted at SRS. The “Tritium R&D” missions are largely performed at LANL, with lesser amounts performed at both LLNL and SRS.

Section 3.9.1 describes the facilities for the Tritium R&D No Action Alternative, Section 3.9.2 describes an alternative of consolidating Tritium R&D at SRS, Section 3.9.3 describes an alternative of consolidating Tritium R&D at LANL, and Section 3.9.4 describes the alternative of reducing Tritium R&D in place. The analysis of the environmental impacts of the reasonable alternatives is contained in Section 5.14.

Tritium R&D Alternatives

- **No Action.** Continue operations at LLNL, LANL, SRS, and SNL/NM[1]
- **Consolidate tritium R&D at SRS.** Move gas transfer system R&D support from LLNL[2] and LANL to SRS
- **Consolidate tritium R&D at LANL.** Move gas transfer system R&D support from LLNL to LANL
- **Reduce tritium R&D in place.** LLNL, LANL, and SRS would reduce operations

[1]Tritium Operations at SNL/NM are primarily associated with the Neutron Generator Production Facility, which is unaffected under all alternatives.
[2] Does not include National Ignition Facility (NIF) target R&D and NIF production target filling. Those operations would remain at LLNL under all alternatives.

3.9.1 Tritium R&D No Action Alternative

Under the No Action Alternative, NNSA would continue ongoing tritium activities at current sites. This would entail the following tritium operations.

3.9.1.1 *Lawrence Livermore National Laboratory*

The LLNL Tritium Facility is located within the Superblock (see Figure 3.9-1) at the main Livermore site. The facility has an administrative limit of 35 grams of tritium, and a material-at-risk limit of 30 grams. The primary tritium mission of the Tritium Facility is NIF target R&D with target filling to be added in support of the NIF Ignition Campaign beginning in 2009. Under all alternatives, the NIF target R&D and target filling would remain at LLNL. The facility also hosts limited GTS R&D experiments conducted by SNL/CA researchers, which are engaged in neutron generator development and provide maintenance and recertification services for the UC-609 Type B tritium shipping package. These R&D activities, which occur in one glove box and involve less than 10 people, could be affected by the alternatives in this SPEIS.

Figure 3.9-1—LLNL Tritium Facility

3.9.1.2 *Los Alamos National Laboratory*

The LANL Weapons Engineering Tritium Facility (WETF) is located at TA-16, a remote area with controlled access (that is, a limited security area) (Figure 3.9-2). The WETF performs tritium R&D in support of LANL's stockpile stewardship mission, primarily the gas transfer system (GTS) design mission for use in weapons. Support of the GTS mission requires flexibility to quickly react to issues that are discovered in the stockpile. The primary use of tritium in the stockpile is in GTSs which require large quantities of tritium. Typical WETF tritium processing activities include: (1) loading and unloading; (2) removing tritium decay products and other impurities from gaseous tritium; (3) mixing tritium with other gases; (4) analyzing tritium as mixtures; (5) loading tritium onto various metals and metal alloys; (6) repackaging tritium and other gases to user specifications; (7) environmental storage and conditioning of GTS components; (8) performing various user-defined experiments with tritium; (9) unloading (depressurizing) containers of tritium; and (10) functionally testing R&D GTSs.

Figure 3.9-2—Aerial Photo of the WETF

All tritium R&D at LANL is supported by 25 people. The number of programmatic R&D researchers is approximately 10 FTEs, with portions of R&D support staff providing the remaining 15 FTEs (performing gas analysis, gas mixing, R&D material preparation, R&D apparatus construction/maintenance, etc.).

3.9.1.3 *Savannah River Site*

The SRS Tritium Facilities, shown in Figure 3.9-3, support the NNSA Stockpile Stewardship missions for tritium target extraction; tritium unloading, purification and enrichment; tritium and non-tritium reservoir loading; reservoir reclamation; and GTS surveillance. These are collectively referred to as the "tritium production" missions, although the actual production of new tritium is carried out in a Tennessee Valley Authority reactor, with extraction taking place at SRS in the Tritium Extraction Facility (TEF), which became operational in late 2006. Final processing of new tritium gas from TEF, as well as all other tritium gas processing, is carried out in the H-Area New Manufacturing Facility (HANMF). This facility became operational in 1994 and was also designed for a 40 year service life. The Tritium Facility Modernization & Consolidation Project, completed in 2004, significantly expanded the tritium gas processing capabilities in the HANMF and added surveillance capabilities in a new 234-7H facility.

Figure 3.9-3—Aerial Photo of SRS Tritium Facilities

The SRS Tritium Facilities, shown in Figure 3.9-3, are located adjacent to H-Area near the center of the site and about 7 miles from the nearest site boundary. All tritium gas processing is done within secondary containment glove-boxes or modules which have either nitrogen or argon atmospheres. The glovebox and module atmospheres are continuously re-circulated through stripper systems to recover any tritium which may leak out of piping or components. All gas streams released to the environment are processed through a recovery system to reduce emission to as low as reasonably achievable. The tritium R&D at SRS is related to the process and is a very small segment of the overall Tritium R&D. It is conducted primarily to support the ongoing tritium extraction, loading and surveillance missions at SRS.

3.9.1.4 *Sandia National Laboratories/NM*

Tritium Operations at SNL/NM are primarily associated with the Neutron Generator Production Facility (NGPF). The primary responsibility of the NGPF is to produce and manufacture neutron generators, which fuse deuterium and tritium to produce neutrons used to initiate the fission reaction in nuclear weapons. The neutron generator is a "limited-life" component of a nuclear weapon that uses tritium and must be replaced periodically due to the relatively short half-life of tritium. SNL/NM also performs weapons research qualification and testing on neutron tube and generator materials, process and lot samples, sub-components, and post-mortem examinations on final product. The department also performs technical studies that characterize processes and products in collaboration with production and development and design organizations. Section 3.15 describes why no alternatives were studied in detail for changing the SNL/NM tritium missions.

3.9.2 Consolidate Tritium R&D at SRS Alternative

Under this alternative, tritium R&D currently conducted at LLNL[38] and LANL would be consolidated at SRS into existing facilities (primarily in the TEF, HANMF, and the 234-7H facility, but may also include the H-Area Old Manufacturing Building and facilities at the Savannah River National Laboratory). No new construction would be necessary to consolidate these missions. With this option, an on-site office, staffed with approximately 25 personnel to perform tritium R&D, would be required. Office space exists at SRS to support these personnel. Personnel from LANL would travel to SRS to conduct experiments, as necessary. Approximately 25 personnel at LANL could be affected by the transfer of tritium R&D to SRS. Upon completion of the transition to SRS, funding associated with tritium R&D activities at LANL would no longer be required.

Transferring the LLNL tritium R&D (not NIF tritium work) to SRS would basically amount to adding one glove box, which could be accommodated in the HANMF without any significant changes. Phasing out tritium R&D operations at LLNL would have no significant effect on tritium emissions, wastes, and exposure to personnel. Personnel from LLNL would travel to SRS to conduct experiments, as necessary.

[38] This does not include NIF target R&D and NIF production target filling. Those operations would remain at LLNL under all alternatives (see Section 3.9.5.4).

3.9.3 Consolidate Tritium R&D at LANL Alternative

Under this alternative, tritium R&D currently conducted at LLNL[39] would be consolidated at LANL into the WETF. No new construction would be necessary to consolidate these missions. Transferring the LLNL tritium R&D to LANL would basically amount to one glove box system, which could be accommodated in the WETF without any significant changes. LANL already performs same type work within WETF.

3.9.4 Reduce Tritium R&D in Place Alternative

Under this alternative, no changes in assigned tritium R&D missions would result. Instead, LLNL, LANL, and SRS would reduce tritium operations in-place. This alternative would result in the least transition impacts in the Complex. All three sites would increase efficiencies in tritium operations by improving planning and scheduling of activities. Any reductions in tritium emissions, wastes, and exposure to personnel are expected to be small, as these are a function of the work requirements and would not be significantly affected by improved planning and scheduling.

[39] This does not include NIF target R&D and NIF production target filling. Those operations would remain at LLNL under all alternatives (see Section 3.9.5.4).

3.10 NNSA FLIGHT TEST OPERATIONS FOR GRAVITY WEAPONS

This section describes the alternatives for NNSA Flight Testing. The affected environments at sites involved in NNSA Flight Testing are presented in Sections 4.3 (NTS), 4.4 (Tonopah Test Range), and 4.7 (White Sands Missile Range). The environmental impacts of the HE R&D alternatives are presented in Section 5.15. Section 3.16 contains a summary of the environmental impacts of the NNSA Flight Testing alternatives. Together, these sections provide the environmental impact information for the NNSA Flight Testing alternatives.

Introduction. SNL manages Flight Test Operations for gravity weapons (bombs) to assure compatibility of the hardware necessary for the interface between weapons and the delivery system, and to assess weapon system functions in realistic delivery conditions. The actual flight tests are conducted with both the B83 and B61 weapons, which are pulled from the stockpile and converted into units called Joint Test Assemblies (JTAs). These flight tests are presently conducted at the Tonopah Test Range (TTR), a 280 square-mile site, located about 140 air-miles northwest of Las Vegas, Nevada. TTR activities include: stockpile reliability testing; structural development R&D; arming, fuzing, and firing testing; testing delivery systems; and environmental restoration. NNSA operates this facility under the terms of a land use agreement with the United States Air Force (USAF) entitled “Department of the Air Force Permit to the NNSA To Use Property Located On The Nevada Test and Training Range, Nevada.”.

Conversion of nuclear weapons into JTAs is a multi-step operation. Pantex denuclearizes the weapons that become JTAs. The JTAs are not capable of producing nuclear yield. They may then be further modified at SNL. JTAs are then dropped from aircraft at various altitudes and velocities. Depleted uranium usually remains in JTAs, but because there is no explosive event, the depleted uranium is contained within the weapon case and completely recovered after each test. There is no contamination of the soil as the result of a flight test. In some cases, JTAs are flown at velocities and altitudes of interest and not dropped. In such cases, the aircraft returns to its base with the JTA on-board. In an average year, ten JTAs are tested at TTR. Historically, JTAs included SNM, but NNSA does not plan to use SNM in JTAs after 2008. Therefore, all alternatives assume that SNM would not be present in future JTAs.

In addition to analyzing the impacts associated with the No Action Alternative, four alternatives for conducting NNSA flight test operations are evaluated in this SPEIS. These alternatives are as follows: (1) upgrade the Flight Test Program at TTR; (2) operate the program at TTR in a “campaign” mode; (3) transfer the program to White Sands Missile Range (WSMR) in New Mexico; and (4) transfer the program to NTS. Specific locations within WSMR and NTS are being evaluated to assure that the required geological conditions exist to successfully support all flight testing requirements. The locations are also being evaluated for the sufficiency of flight corridors for movement of test aircraft to the target areas. Infrastructure such as power and roads would also be needed at these new locations or they would have to be constructed to support flight testing activities. NNSA has conducted flight tests at facilities other than TTR, on occasion, when specific test requirements could not be met at TTR. Under any of the alternatives considered in this SPEIS, NNSA may continue to conduct one or more flight tests at a different facility, consistent with environmental reviews for that site.

Section 3.10.1 describes the No Action Alternative, Section 3.10.2 describes the alternative to upgrade TTR, Section 3.10.3 describes the alternative to operate TTR in a campaign mode, Section 3.10.4 describes the alternative to transfer NNSA's flight testing mission to WSMR, and Section 3.10.5 describes the alternative to transfer the mission to NTS. Analysis of the environmental impacts of the alternatives is contained in Section 5.15. The analysis of alternatives does not affect NNSA's responsibilities at TTR relating to post-weapons testing by the Atomic Energy Commission, a predecessor agency of DOE (See Section 4.4.6.2.1). Any remediation related to such post-weapons testing is independent of decisions to be made as a result of this SPEIS.

NNSA Flight Test Operations Alternatives

- **No Action.** Continue operations at TTR
- **Upgrade Alternative.** Continue operations at TTR and upgrade equipment with state-of-the-art mobile technology
- **Campaign Mode Operations.** Continue operations at TTR but reduce permanent staff and conduct tests with DOE employees from other sites. Three options are assessed:
    - Option 1—Campaign from NTS: Reduce mission staff and relocate remaining Sandia staff to NTS; O&M and Security taken over by NTS. Additional contract for technical support of equipment is needed for maintenance and upgrade.
    - Option 2—Campaign Under Existing Agreement: Reduce mission staff at TTR; campaign additional staff for each test series; SNL to retain O&M responsibilities at TTR; Agreement would be retained in current form; security responsibilities would be transferred to the Air Force.
    - Option 3—Campaign Under Reduced Footprint Agreement: Reduce mission staff at TTR; campaign additional staff for each test series; SNL to retain O&M responsibilities at TTR; Agreement would be reduced to potentially less than 1 square mile; security, emergency services, power line and road maintenance responsibilities transferred to the Air Force.
- **Transfer to WSMR.** Move NNSA Flight Testing from TTR to WSMR
- **Transfer to NTS.** Move NNSA Flight Testing from TTR to NTS

3.10.1 No Action Alternative

Under the No Action Alternative, NNSA would continue to conduct the flight test mission at TTR. This section describes the NNSA test program currently being conducted at TTR. Figure 3.10–1 shows the location of TTR. There would be no construction required at TTR for this alternative. The current facilities would remain serviceable. Minimal investments in equipment would be required for the No Action Alternative, as described below:

Radar. This would include a replacement of one radar with a modern unit, maintenance of a second radar; and the acquisition of an Identification, Friend or Foe (IFF) system. The acquisition of this IFF system would allow elimination of 2 existing maintenance-intensive radar systems.

Optics. Three distinct functional upgrades would include: (1) addition of a Time-Space

Positioning Information (TSPI) section to collect precise positional data; (2) addition of an Event Optics section using telescope tracking mounts to record event data; and (3) addition of a Photometrics section using both high speed fixed camera arrays to augment the existing still photography capability.

Facilities. TTR would continue to use the existing facilities and maintain them within the normal budget process. A new HVAC system for the control facility and a roof and siding repair on one building would be required under this alternative. Repair to the electrical grid and road surfaces would also be required. In addition to these repairs, there are several structures that must undergo D&D in order to continue ongoing operations at TTR.

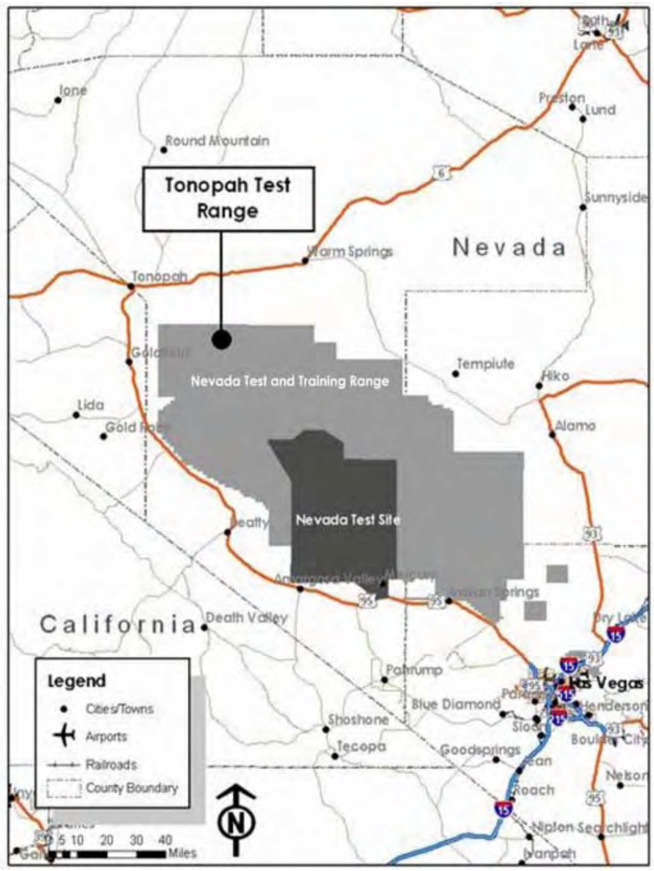


Figure 3.10-1—Location of TTR and NTS

3.10.2 Upgrade of Tonopah Test Range Alternative

This alternative, the HTM Upgrade Alternative, would use High-Tech Mobile (HTM) equipment to reduce the operational costs at TTR through the introduction of newer, more efficient, and more technologically advanced equipment. This alternative would lower the work force requirement and keep test equipment highly reliable and operational between test dates, thereby reducing recalibration and start-up costs. Under this alternative, additional range campaign activities could be considered and conducted with minimal additional costs.

A vision of a HTM Upgrade Alternative is shown in Figure 3.10-2. It would include the acquisition of modern digital equipment that is compatible with other national test range standards. The emphasis is on highly mobile command, telemetry, communications, and radar units which could be readily moved to the different testing locations at TTR. This would not only eliminate the need for duplicative permanent structures, but would also eliminate costly start-up calibration.

The actions required for the HTM Upgrade Alternative are as follows:

Documentary/time-space-position information (TSPI) optics. This action would include an additional five combined mount [TSPI and documentary telescopes] units with a separate optics Control Trailer for remote control operations. Encryption capability would be included.

Radar. The proposal is equivalent to that described for the No Action Alternative.

Telemetry. New trailers, fully equipped with telemetry equipment and antennas, would be purchased and all trailers would be DOT certified. This would allow the telemetry equipment and the antennas to be fully mobile.

Operations control equipment. Two operational control trailers, fully equipped, would be acquired to replace the operations that currently take place in the operational control tower at TTR. Test coordination, communications, and safety would all be housed in these trailers. Operation displays would provide continuous coverage of the test in progress.

Facilities. The proposal is identical to that described for the No Action Alternative.

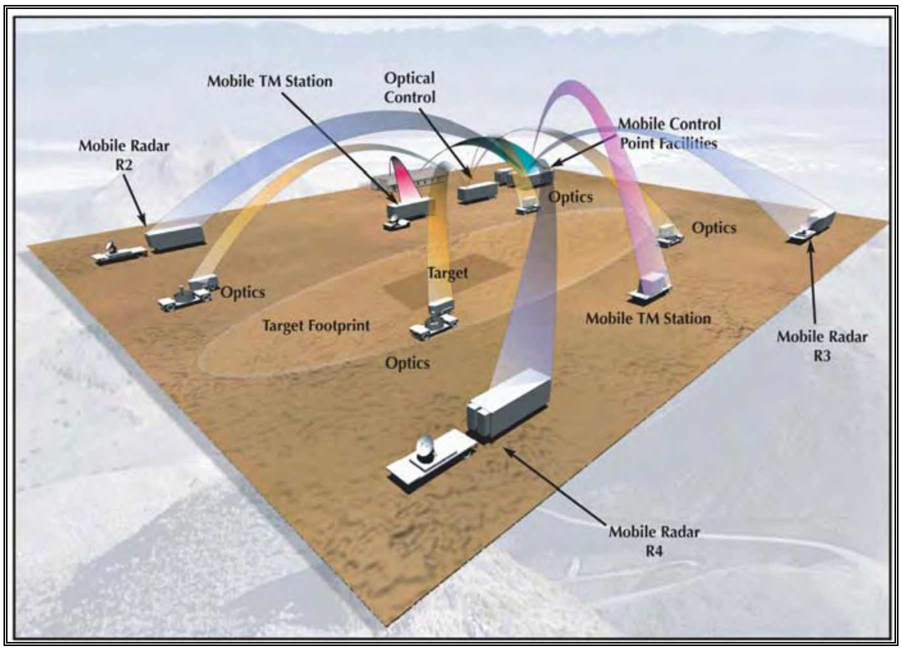


Figure 3.10-2—HTM Upgrade Alternative

There would be no construction required for the HTM Upgrade Alternative. It would use existing infrastructure and personnel, without any increases in the number or intensity of tests and the operational resource requirements would be about the same as for the No Action Alternative. TTR would continue to use the existing facilities and maintain them within the normal budget process. A new HVAC system for the control facility and a roof and siding repair on one building would be required under this alternative. Repair to the electrical grid and road surfaces would also be required. In addition to these repairs, there are several structures that must undergo D&D in order to continue ongoing operations at TTR

3.10.3 Campaign Mode Operation of TTR

An alternative to relocating NNSA's flight test operations from TTR to another site would be to conduct the JTA tests at TTR on a campaign basis, bringing in employees from other NNSA sites to conduct tests. SNL would continue as the program manager for this operation. Under this alternative, three options are evaluated, as described in Table 3.10.3-1.

Table 3.10.3-1—Options for the Campaign Mode Operation of TTR

	Option 1-- Campaign from NTS	Option 2—Campaign under existing Agreement	Option 3-- Campaign under reduced footprint Agreement
Sandia Staff	Approximately ½ of current TTR staff work from NTS	Approximately ½ of current staff stay at TTR	Approximately ½ of current staff stay at TTR
Campaign Staff	Up to 20 test support personnel campaigned from NTS, Sandia NM & CA	Up to 20 test support personnel campaigned from NTS, Sandia NM & CA	Up to 20 test support personnel campaigned from NTS, Sandia NM & CA
Campaign Period	Each mission would require two week assignment	Each mission would require two week assignment	Each mission would require two week assignment
Campaign Frequency	Up to approximately 12 deployments per year + 1 training period per year	Up to Approximately 12 deployments per year + 1 training period per year	Up to Approximately 12 deployments per year + 1 training period per year
Land Use Agreement	280 sq miles	280 sq miles	Potentially less than 1 sq mile
Technical Contract	New contract required to maintain equipment at TTR during year	None required	None required
O&M Contract	Contractor Managed by NTS	Contractor managed by Sandia	Contractor managed by Sandia
Security	Provided by NTS	Provided by the USAF	Provided by the USAF
Medical and Emergency Services	Provided by NTS	Downsized -Occupational Medicine and Rescue retained	Downsized -Occupational Medicine and Rescue retained
Infrastructure Maintenance	Provided by NTS	Provided through Sandia contract	Provided by the USAF
Road and Power Line Maintenance	Provided by NTS	Provided through Sandia contract	Provided by the USAF
Deep Recovery of JTAs	Provided by NTS	Provided through Sandia contract	Provided through Sandia contract
Equipment investment –	New mobile and transportable equipment	Upgrades to existing equipment	Upgrades to existing equipment

USAF = U.S. Air Force
Source: NNSA 2008a.

<u>Campaign from NTS – additional details:</u>

1. Equipment investment:
   - Radar: Convert one fixed radar to mobile radar and completely refurbish pedestal;
   - Optics: Purchase 3 new documentary telescopes and upgrade 7 cinetheodolites (highly sophisticated optical tracking devices);
   - Telemetry: Replace equipment at risk and refurbish telemetry dish and mounts;
   - Communication Infrastructure: Create Ethernet cell configuration along lake beds and connect Ethernet cells using new fiber optic cable.
2. By the end of 2015, NNSA might decide to:
   - Discontinue NNSA Flight Testing at TTR in approximately 2019 and use the interim period to transition equipment and establish needed infrastructure at NTS or WSMR; or
   - Renew the USAF – DOE permit at TTR (which expires in 2019) and continue work at that site, managed by the Nevada Site Office and SNL.

<u>Campaign Under Existing Permit or Reduced Footprint Permit – additional details:</u>

1. Equipment investment:
   - Radar: Replace electronics in one fixed radar and perform depot level maintenance on pedestal;
   - Optics: Replace all film still and video cameras with modern high frame rate digital units and replace control and pedestal discrete electronics with modern personal computer based commercial-off-the-shelf equipment;
   - Telemetry: Replace equipment at risk and refurbish telemetry dish and mounts;
   - Communication Infrastructure: Use existing radio frequency and fiber backbone and convert custom communications interface to modern commercial-off-the-shelf Ethernet backbone.

3.10.4 Transfer to WSMR Alternative

This alternative involves transferring NNSA flight test operations conducted at TTR to WSMR, near White Sands, New Mexico. Figure 3.10–3 shows the location of WSMR. WSMR is the largest installation in the DoD, and is a major range and test facility base under the Department of the Army Test and Evaluation Command, Developmental Test Command. WSMR possesses extensive capabilities and infrastructure used by the Army, Navy, Air Force, NNSA and other government agencies as well as universities, private industry and foreign militaries. No NNSA activities currently take place on the WSMR. WSMR covers 3,420 square miles on the ground and 10,026 square miles of contiguous restricted airspace managed, scheduled and controlled by the WSMR. Holloman Air Force Base is adjacent to the range's east boundary and has capabilities for aircraft support and staging.

WSMR has a full suite of flight test instrumentation including radar, telemetry and optical equipment, which would allow complete coverage of NNSA gravity weapons flight testing. As a major range and test facility base, the range's infrastructure and instrumentation are funded by DoD. WSMR has extensive experience conducting flight tests with requirements and flight scenarios similar to the NNSA program, including penetrating weapons, weapons recovery and handling of classified material and special nuclear materials.

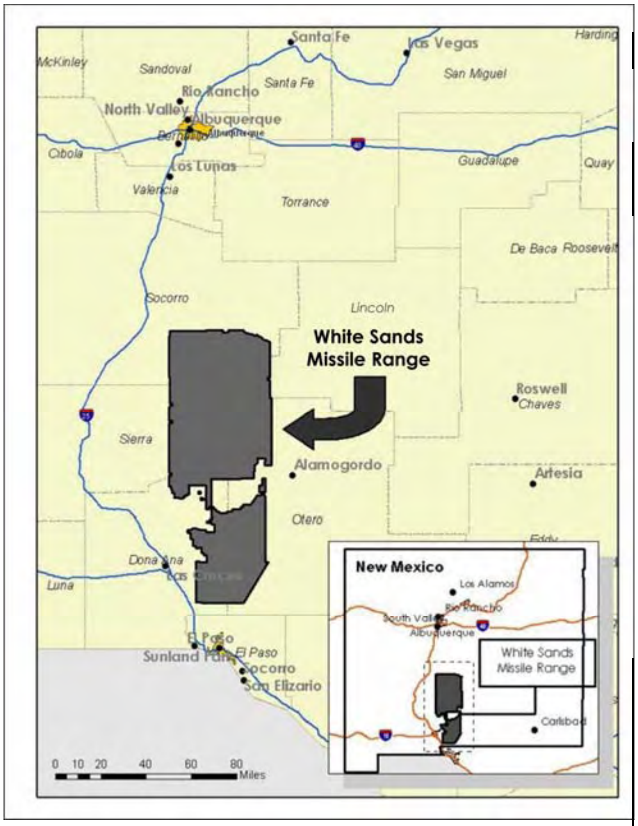


Figure 3.10-3—Location of White Sands Missile Range

3.10.4.1 *Siting Locations*

The northwest area of the WSMR would provide several sites suitable for flight testing. Preliminary drilling was conducted at several specific locations within WSMR to determine that the required geological conditions exist to successfully support all flight testing requirements. The locations are being evaluated to assure that the geology would support penetrator testing as well as the sufficient flight corridors for ingress and egress of test aircraft to target areas. Infrastructure such as power and roads would also need to exist or would need to be constructed to support flight testing activities. A review of the preliminary data indicate that this area of the WSMR could accommodate the safety footprints of all current flight test scenarios. Appropriate NEPA analysis would be required prior to any detailed drilling of any of the candidate sites in order to assess the environmental impacts associated with the required construction of pads and a target and the operations associated with flight testing.

The only construction that would be required to support the JTA flight test operations at the WSMR would be the installation of a circular concrete target. The target aids in recovery of the JTAs used in flight test drops. The concrete target would be constructed of non-reinforced concrete, 500 feet in diameter, with a depth of 12 inches.

Under this alternative, NNSA Flight Testing at TTR would be discontinued. The environmental impacts of discontinuing flight testing at TTR are addressed in Section 5.15.4.2.

3.10.5 Transfer to NTS Alternative

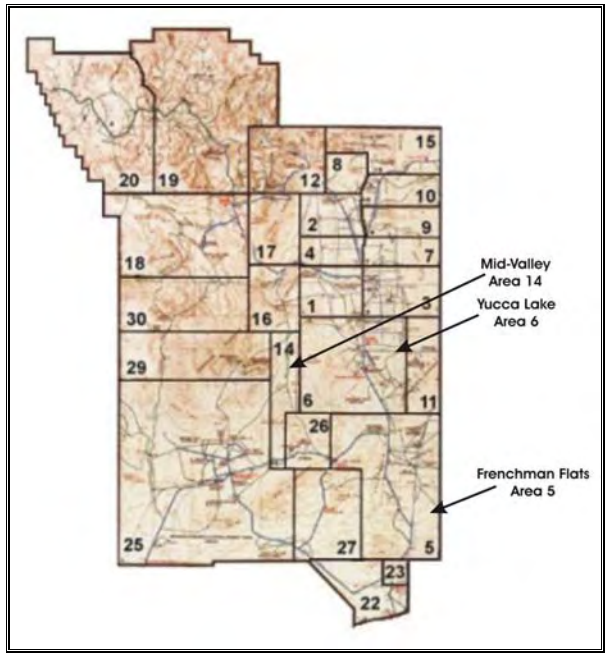


Figure 3.10-4—Potential Flight Test Target Locations at NTS

This alternative involves transferring NNSA Flight Test Operations to NTS (Figure 3.10-4). It is estimated that a site of about two acres would be required. A review of three possible Areas at NTS (five separate sites) was conducted (see Figure 3.10-4). NNSA evaluated these locations at NTS to determine if flight testing could be conducted safely with the appropriate ingress and egress corridors for flight test aircraft and if the soil geology was suitable for testing requirements. Preliminary drilling was conducted to assure that the location would have the required soil geology. Appropriate NEPA analysis would be required prior to any detailed drilling of any of the candidate sites in order to assess the environmental impacts associated with the required construction of pads and a target and the operations associated with flight testing. Although the isolation of the NTS is a benefit for security and flight path purposes, the remoteness of these site locations could require an investment in road and utility infrastructure. A preliminary assessment indicates that these sites meet the necessary safety criteria for flight paths and target location to permit the program to use these areas of NTS. Other sites may be available at NTS, but these three sites meet the mission needs and provide a reasonable number of site alternatives for consideration.

If this alternative were to be selected, transition from TTR to NTS could occur as early as the latter part of 2009 and the beginning of 2010. Upgrades would only begin after the construction of the needed facilities was completed and transition of personnel and equipment completed. NNSA would need to construct pads and a target and possibly some road and utility infrastructure. [a1]Flight Test Program system upgrades would only begin after completion of the required NEPA analysis, construction of required infrastructure and facilities, and the completion of transition. The JTA Flight Test Program staff would be housed in CP-40, an existing NTS facility that includes office space and an available high-bay area, which could accommodate high-tech mobile equipment. Minor building preparation could be required. The concrete target would be constructed of non-reinforced concrete, 500 feet in diameter with a depth of 12 inches.

Under this alternative, NNSA Flight Testing at TTR would be discontinued. The environmental impacts of discontinuing this testing are addressed in Section 5.15.4.2.

3.11 HYDRODYNAMIC TESTING

This section describes the alternatives for hydrodynamic testing. The affected environments at sites involved in hydrodynamic testing are presented in Sections 4.1 (LANL), 4.2 (LLNL), 4.3 (NTS), 4.5 (Pantex), and 4.6 (SNL/NM). The environmental impacts of the hydrodynamic testing alternatives are presented in Section 5.16. Section 3.16 contains a summary of the environmental impacts of the hydrodynamic testing alternatives. Together, these sections provide the environmental impact information for the hydrodynamic testing alternatives.

Introduction. Hydrodynamic testing (hydrotesting) use high-explosive experiments to assess the performance and safety of nuclear weapons. Data from hydrotesting and other experiments, combined with modeling and simulation using high performance computers, are used to certify the safety, reliability, and performance of the physics packages of nuclear weapons without underground testing. The alternatives for hydrotesting are explained in the sections that follow. Section 3.11.1 discusses the No Action Alternative, which would continue operations at the existing facilities at LANL, LLNL, NTS, SNL/NM, and Pantex. Section 3.11.2.1 discusses an alternative which would reduce the number of existing hydrotesting facilities at LANL, LLNL, and NTS, and discontinue hydrotesting at SNL/NM and Pantex. Section 3.11.2.2 discusses an alternative that would consolidate non-fissile hydrotesting activities at LANL (the Big Explosives Experimental Facility [BEEF] at NTS would also still be required). Section 3.11.2.3 discusses a next generation alternative which would consolidate all hydrotesting activities at the NTS. The analysis of the environmental impacts of the alternatives is contained in Section 5.16.

Hydrodynamic Testing Alternatives

- **No Action.** Continue hydrotesting at LLNL, LANL, NTS, Pantex, and SNL/NM
- **Downsize in place**
  - Consolidate LLNL hydrotesting at Contained Firing Facility (CFF)
  - Consolidate LANL hydrotesting at Dual Axis Radiographic Hydrodynamic Test (DARHT) facility
  - Consolidate NTS hydrotesting at single confined and single open-air sites
  - Discontinue hydrotesting at Pantex and SNL/NM
- **Consolidate at LANL**
  - Integrate hydrotesting program at LANL
  - Construct new CFF-like facility at LANL
  - Discontinue hydrotesting at LLNL once CFF-like facility is operational
  - Maintain BEEF at NTS
  - Discontinue hydrotesting at Pantex and SNL/NM
- **Consolidate at NTS**[1]
  - Integrate hydrotesting program at NTS
  - Construct new DARHT-like facility at NTS
  - Construct new CFF-like facility at NTS
  - Discontinue hydrotesting at LLNL, LANL, Pantex, and SNL/NM

[1]The NTS Alternative is considered a "next generation" alternative because NNSA is not proposing these changes at this time.

3.11.1 No Action Alternative

This section describes the hydrotesting facilities and missions currently conducted at NNSA sites. More details regarding hydrotesting requirements and existing facilities are contained in Appendix A.

3.11.1.1 *Hydrotesting Facilities at LLNL*

LLNL's Site 300 has been used since 1955 to perform experiments that measure variables important to nuclear weapons' behavior, safety, conventional ordnance,, and accidents (such as fires) involving explosives. These experiments are conducted without fissile material. The facilities used for Site 300 activities include four firing point complexes and associated support facilities. The locations of the four firing complexes are indicated in Figure 3.11-1. The Building 801 Complex is comprised of Buildings 801A, 801B, and 801D, and encompasses approximately 51,000 square feet. The Building 801 Complex is in the northeast quadrant of the site, called the east firing area.

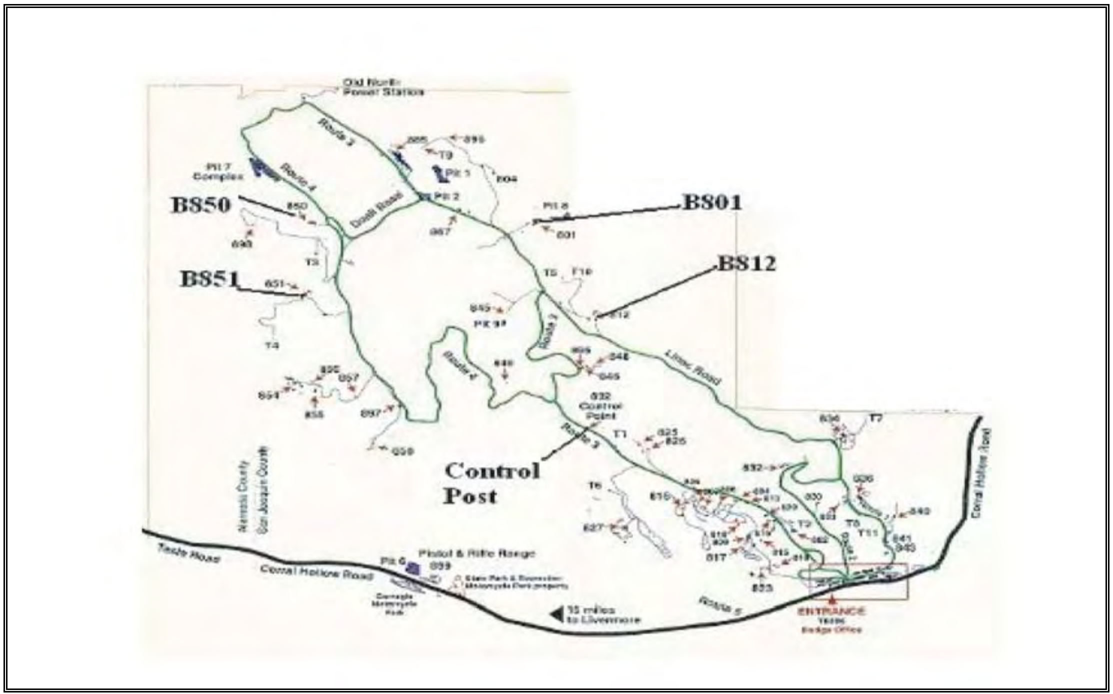


Figure 3.11-1—Locations of B801, B812, B850, and B851 at Site 300

The Contained Firing Facility (CFF) is located at the Building 801 Complex and is one of the more important facilities in NNSA's science-based SSP, as it is capable of full-scale dynamic weapons radiography (Figure 3.11-2). The CFF drastically reduces emissions to the environment and minimize the generation of hazardous waste, noise, and blast pressures, although emissions from open air testing are well within current environmental standards. LLNL's Hydrodynamic Test Program employs 56 workers. Thirty of these employees are at the Building 801 Complex, of which 10 are at the CFF. Appendix A, Section A.9, provides additional information on the LLNL hydrotesting facilities.

Figure 3.11-2—The Contained Firing Facility at the LLNL Site 300 Building 801 Complex

3.11.1.2 *Hydrotesting Facilities at LANL*

The hydrotesting facilities at LANL are located within one of the TAs that contain HE R&D facilities. TA-15, located approximately 3 miles from the main administrative area, in the central portion of LANL, is the location of two firing sites: the DARHT, which has an intense high-resolution, dual-machine radiographic capability, and Building 306 (R306), a multipurpose facility where primary diagnostics are performed (see Figure 3.11-3). Currently, there exists no permanent radiographic capability at R306. Figure 3.11-3 shows the location of TA-15 at LANL. The Pulsed High Energy Radiation Machine Emitting X-Rays (PHERMEX) Facility, a multiple-cavity electron accelerator capable of producing a very large flux of x-rays, was disabled in 2004. D&D of this facility is ongoing and has not yet been completed. LANL conducts about 100 hydrotest experiments per year composed of both large scale and smaller scale "focused" experiments. LANL has a Hydrodynamic Test Program staff of 34 employees, of which 29 are at the DARHT.

DARHT is a state-of the-art, full scale radiography facility and is used to investigate weapons functioning and systems behavior in non-nuclear testing. DARHT is designed to include two high intensity x-ray machines whose beams cross at right angles. Each machine has been designed to generate radiographs of far higher resolution than anything previously obtainable—the resolution required for stockpile stewardship without underground nuclear testing. The first axis became operational in 1999 and the second axis was tested in late 2002. In 2003, LANL began refurbishing failing accelerator cells Facility Axis II in order to bring them up to design specifications.

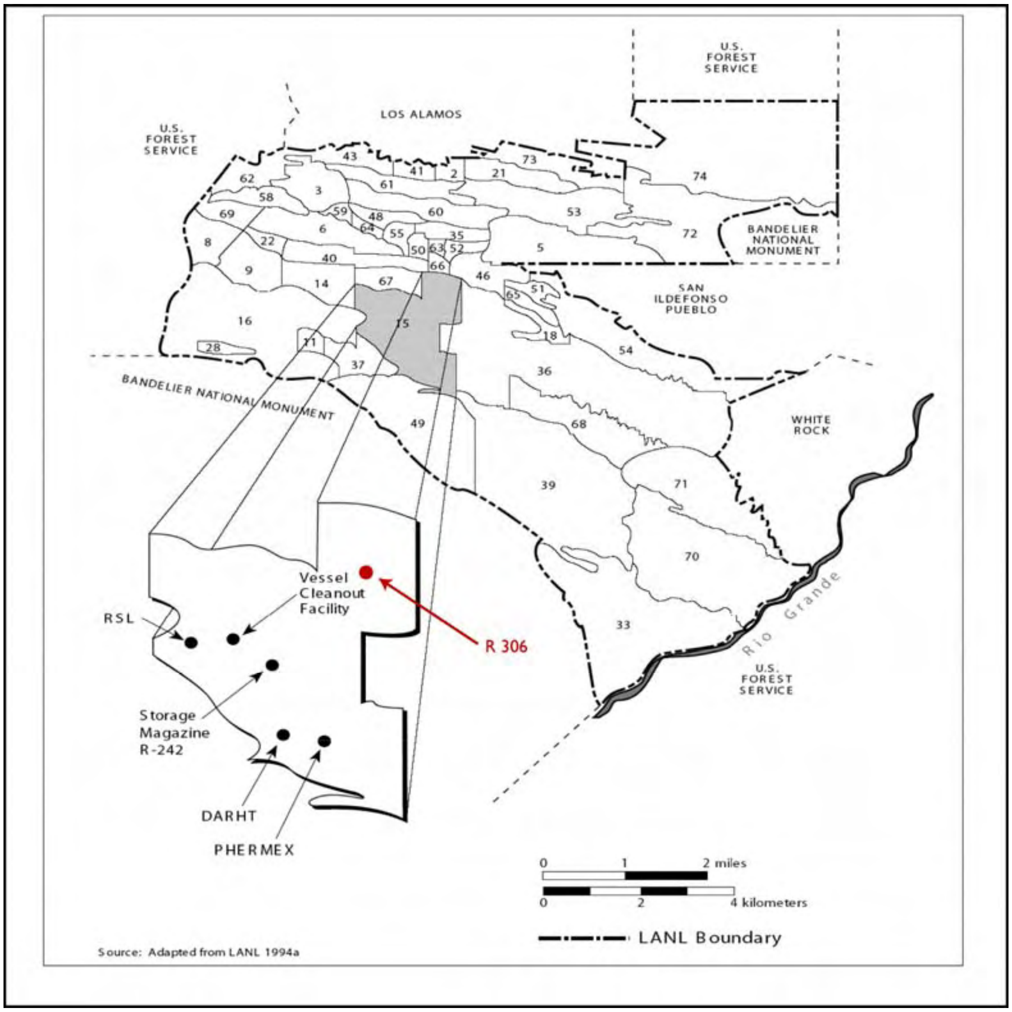


Figure 3.11-3—TA-15 at LANL

The injector for the second axis of DARHT is now being "tuned" in preparation for undergoing commissioning tests. When DARHT becomes fully operational, its multi-axis large scale hydrodynamic tests will allow researchers to obtain three-dimensional as well as time-resolved radiographic information. Figure 3.11-4 shows the DARHT facility.

Additional facilities required to support hydrotesting are located in six other TAs at LANL. The Test Device Assembly is one such facility. The Test Device Assembly provides the capacity to assemble test devices ranging from full-scale nuclear-explosive-like assemblies (where fissile material has been replaced by inert material) to materials characterization tests. In addition, LANL has several idle hydrotesting facilities, such as the PHERMEX, awaiting closure. Appendix A, Section A.9, provides additional information on the LANL hydrotesting facilities.

Figure 3.11-4—The DARHT at LANL

3.11.1.3 *Hydrotesting Facilities at Pantex, SNL/NM, and NTS*

Smaller hydrotest facilities, which are not capable of dynamic weapons radiography, are also located at Pantex, SNL/NM, and NTS. Both Pantex and SNL/NM have several outside blasting table facilities which are primarily used for HE R&D activities and can only handle small hydrotesting experiments. NTS has several facilities which are utilized for very large explosion-type experiments. The BEEF is one such facility at NTS. It is the only NNSA facility where experiments requiring more than 2000 pounds of HE can be conducted. Similarly, the U1a Complex is the only facility capable of subcritical experiments.

Several specialized NTS facilities are maintained and available to meet both hydrotesting and HE R&D requirements. LANL, LLNL, SNL/NM, DoD, and the Department of Homeland Security (DHS) sponsor experiments at these facilities. They feature an array of diagnostic equipment and expertise to support a variety of hydrotest and HE experiments, including flash x-ray systems, high-speed digitizers, fast-framing cameras, and high-speed digital video systems.

Hydrotest and HE capabilities and facilities at the NTS are as follows:

Big Explosives Experimental Facility (BEEF). Located on a 9-acre site in Area 4 of the NTS, BEEF is an open-air HE test bed for large hydrodynamic and weapons physics experiments, shaped-charge development, and render-safe experiments. BEEF is designed and certified with an operational HE limit of 70,000 pounds (TNT equivalent).

Baker site. Located within Area 27 of the NTS, Baker Site serves as an inspection, storage, assembly (including hand-packing or forming uncased plastic explosives), and disassembly area for HE or HAZMAT and components.

U1a Complex. Located within Area 1 of the NTS, the U1a Complex is an underground laboratory for performing hazardous experiments with HE and SNM, primarily subcritical experiments. It consists of a series of horizontal drifts, each about one-half mile in length and mined at the base of three approximately 950-foot-deep vertical shafts.

Other explosives storage. Located in Area 12 of the NTS, this storage includes four single-story metal explosives magazines. The total HE storage quantity is limited to 70,000 pounds (TNT equivalent). The magazines are generally used for the receipt of large orders of explosive materials and provide for bulk storage of high explosives, blasting agents, and detonators.

Explosive Ordinance Disposal Unit (EODU). Located in Area 11 of the NTS, EODU is an open burn or open detonation (OB/OD) site designed and constructed specifically for the storage and demolition of waste explosive materials. It consists of three explosives storage structures and an EOD pad on which to detonate explosives. Activities are limited to the receipt, storage, and detonation of explosives and explosive materials.

Three additional and similar facilities, at Pantex, conduct both HE R&D and hydrotesting experiments. All three would require upgrades within the next several years. The upgrades would include two open-air firing sites with bunkers and one facility containing indoor firing chambers. SNL/NM has several small HE R&D firing sites and the Explosives Component Facility and ancillary facilities, which have been used for hydrodynamic tests. Because none of SNL/NM's facilities are used primarily for hydrotesting, they are described more completely in the No Action Option for HE R&D in Section 3.8. The Explosives Component Facility and its ancillary locations support the design, development, and life cycle management of all explosive components outside the nuclear package. There are no employees assigned to the Hydrodynamic Test Program at Pantex, SNL/NM, or NTS. Appendix A, Section A.9, provides additional information on the hydrotesting facilities at these sites.

3.11.2 Action Alternatives

3.11.2.1 *Downsize-in-Place Alternative*

The Downsize-in-Place Alternative would continue hydrotesting activities by consolidating LANL activities at the DARHT, consolidating LLNL activities at Building Complex 801 and the CFF, closing the smaller facilities at both of these sites, and moving tests requiring larger amounts of HE to the BEEF at NTS.

This alternative would entail the closure of a number of facilities at LLNL and LANL. It would also entail the closure of facilities at Pantex and SNL/NM. At LLNL, this would entail the closing of Building 812, the Building 850 Complex, and the Building 851 Complex, if they cannot be turned over to another user. The associated support facilities probably would not be impacted by this alternative, as they are smaller multi-purpose facilities which could be of use to other program activities. At LANL, this would entail the closing of all hydrotesting facilities at TA-15, except for DARHT, and TA-36. Closure of the idle PHERMEX would commence. At Pantex, at least six outdoor burn areas, primarily utilized for HE R&D, but sometimes used in conjunction with hydrodynamic test experiments, could be closed. Because none of the facilities at SNL/NM are used primarily for hydrotesting, options for downsizing are discussed in

Section 3.8, High Explosives R&D. NTS would maintain BEEF operational to conduct large tests and continue operations at the U1a Complex.

Closure of approximately a dozen facilities at the above sites would entail a substantial clean-up and D&D effort. Although not heavily contaminated, these facilities all have a substantial amount of reinforced concrete and steel structures designed to withstand sizeable HE explosions. It is estimated that at least 100,000 square feet of hardened concrete and steel structures would have to be dismantled and disposed of.

3.11.2.2 *Consolidation at LANL*

The Consolidation at LANL Alternative would integrate all large-scale hydrotesting at the single location of LANL. Since LLNL and NTS both have capabilities not presently at LANL, this alternative would entail the construction of a new facility at LANL that would have the capabilities of the CFF and Building 801 Complex at LLNL.[40] For a description of what such a new facility would entail, see Section 3.11.1.1, Building 801 Complex. There are three potential sites at LANL where such a "CFF–like" facility could be constructed. Figure 3.11-5 displays these three locations at LANL.

Until such time as these capabilities could be established at LANL, the CFF capabilities at LLNL might have to remain in operation. In addition, it is not anticipated that it would be possible to transfer the capability to conduct experiments requiring very large amounts of HE, presently being conducted at NTS, to LANL. Accordingly, under this alternative, operations at the BEEF and the U1a Complex at NTS would still be required. This alternative would entail a large amount of clean-up and D&D associated with the closure of all hydrodynamic test facilities at LLNL, SNL/NM (based on a joint agreement of the HE R&D Program and the Hydrotesting Program), and Pantex and a substantial number of smaller, idle facilities at LANL. Appendix A, Section A.9, provides additional information on these hydrotesting facilities. It is estimated that this alternative would entail the closure and clean-up of close to 170,000 square feet of hardened concrete and steel structures designed to withstand very large HE explosions.

[40] This SPEIS addresses the closure of the CFF in Section 5.16.3.1. Closing the CFF at LLNL Site 300 could occur whether or not a new CFF-like facility is constructed at LANL.

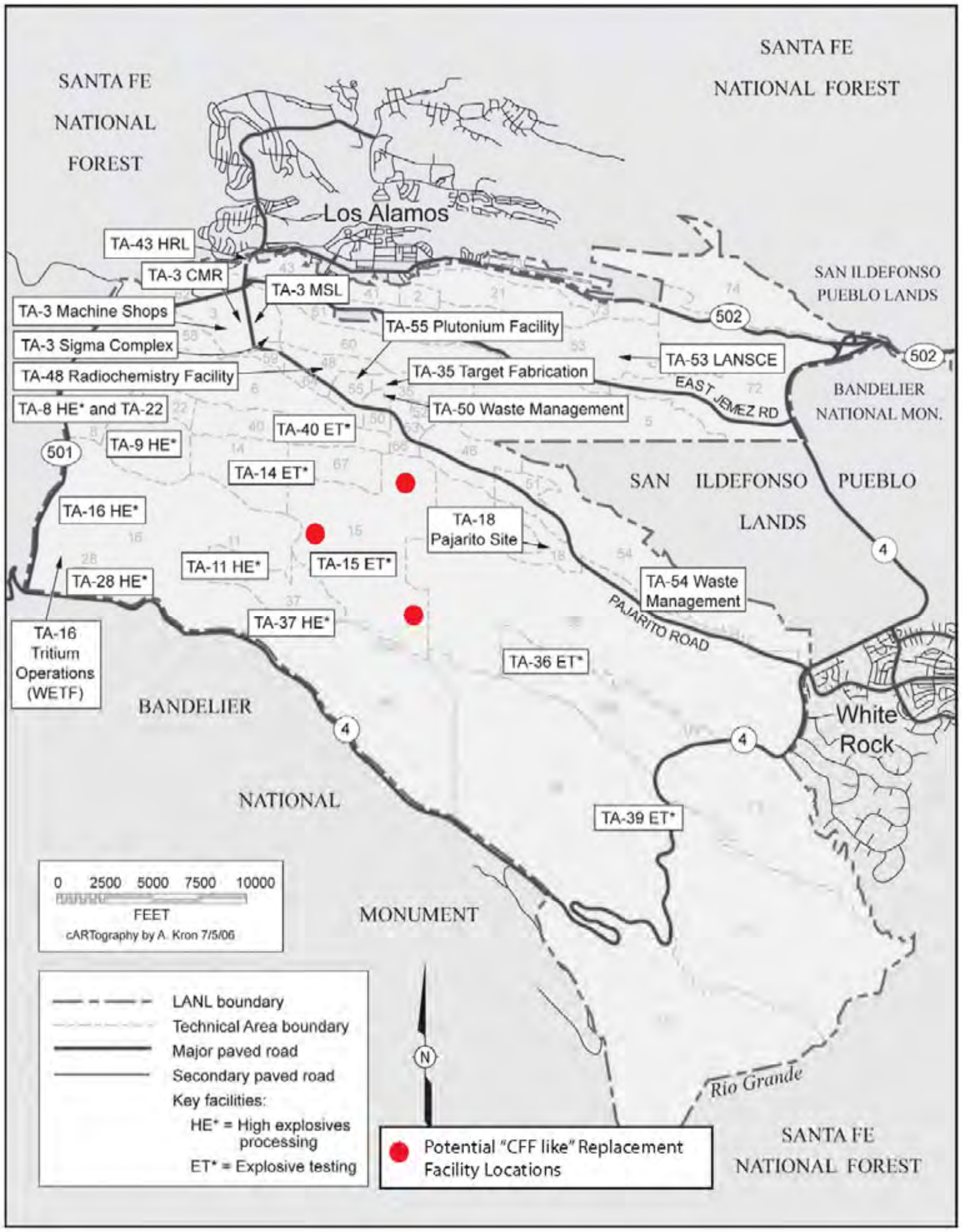


Figure 3.11-5—Potential Locations of "CFF-Like" Replacement Facility at LANL

3.11.2.3 *Consolidation at NTS—A Next Generation Alternative*

Moving hydrodynamic testing to NTS would consolidate the capabilities currently at LANL, LLNL, SNL/NM, and Pantex to the NTS and provide next generation capabilities required to maintain the nuclear deterrent in the 2020 to 2050 time frame. This alternative would require the construction of DARHT-2 and CFF-2 facilities at NTS. Both facilities would be more technically advanced than the existing DARHT and CFF. The design to provide the required capabilities would be addressed when a proposal for these next generation facilities is needed and developed. The discussion below provides reasonable and conservative estimates and options of how the NNSA might proceed.

Gas cavity radiography would require high energy (16 MeV) multi-time multi pulse radiography. Depending on requirements this capability may be provided with DARHT-like technology, proton radiography, or emerging accelerator and detector technology. The architecture of the facility would depend on specific requirements for dynamic SNM experiments. One option is a consolidated facility using large, flexible firing chambers and additional containment vessels for SNM experiments. This facility could be located above or below ground depending on operational and construction costs. Another option is two separate facilities because of the difference in operational requirements between SNM and surrogate experiments.

The complex experiment requirements could be met by utilizing two firing chambers optimized for wide angle, medium (≥6MeV) or high (≥16MeV) radiography, velocimetry, high-speed cameras, and pin diagnostics. Such an approach provides the capacity necessary to address focused experiments as well as integrated weapons experiments (IWE's), and still provide for risk mitigation in the event of a single point of failure in one of the firing chambers.

Any next generation hydrodynamic experimental facility, either aboveground or underground, would require new construction and considerable infrastructure (i.e., facilities, equipment, and personnel) to support tests. Existing infrastructure at NTS might be used to the extent practical. In addition to the impacts of construction, the operational requirements for a next generation hydrodynamic test facility might well be greater than that of the combination of the DARHT and CFF facilities. The impacts associated with construction and operation of facilities would depend on the technological approach used to meet requirements. For example, the use of proton radiography could require an accelerator comparable to other large accelerators operated by DOE.

NNSA estimates that over 250 additional workers would be needed for construction and operation of a next generation hydrodynamic test facility. Construction and operation of a next generation hydrodynamic test facility is not anticipated to use large quantities of water. New construction activities are expected to result in an increase in short-term air emissions. Operations of the next generation of hydrodynamic test facilities are expected to have a minimal impact on the air quality considering the impacts of DARHT operations. A next generation hydrodynamic test facility is not expected to impact existing community infrastructure or services in the area; however, depending on the specific design, a proton accelerator could require significant electrical power resources. Waste volumes are not expected to increase substantially over existing operations at NTS, and waste management associated with dynamic experiments with plutonium at NTS could require additional infrastructure. A new CFF-like facility at NTS would be similar to the facility described in the LANL Consolidation Alternative (see Section 3.11.2.2).

3.12 MAJOR ENVIRONMENTAL TEST FACILITIES

This section describes the alternatives for Major Environmental Test Facilities (ETFs). The affected environments at sites with Major ETFs are presented in Sections 4.1 (LANL), 4.2 (LLNL), 4.3 (NTS), and 4.6 (SNL/NM). The environmental impacts of the alternatives are presented in Section 5.16. Section 3.16 contains a summary of the environmental impacts of the Major ETF alternatives. Together, these sections provide the environmental impact information for the Major ETF alternatives.

Introduction. Environmental testing helps NNSA maintain and demonstrate the safety, reliability and performance of the nation's nuclear weapons. The environmental testing facilities (ETFs) are divided into two categories – base ETFs and system ETFs. The base ETFs are those facilities and laboratory scale (or "table-top") items used to evaluate components or subassemblies in the environments defined by the Stockpile-to-Target Sequence (STS) and the Military Characteristics requirements for each nuclear weapon in the stockpile. Every laboratory within the NNSA complex has some base capability essential for day-to-day operations. The system ETFs are those facilities used to test full-scale weapons systems (with or without SNM or assembly/disassembly) or those unique major facilities that are used for development and certification of components, cases, accessories, subsystems and systems. This SPEIS analyses alternatives involving base and system environmental testing facilities, referred to as "major" ETFs that are costly to maintain or have potentially significant environmental impacts. Major ETFs are located at LANL, SNL/NM, LLNL, and NTS.

Section 3.12.1 discusses the No Action Alternative, which would continue operations at the existing facilities at LANL, SNL/NM, LLNL, and NTS. Section 3.12.2 discusses an alternative which would downsize facilities in-place. Section 3.12.3 discusses an alternative that would consolidate major ETFs at one site (NTS or SNL/NM), with an option to move the LLNL Building 334 and the LLNL Site 300 Building 834 Complex ETF capabilities to Pantex. The analysis of the environmental impacts of the alternatives is contained in Section 5.17.

Major ETF Alternatives

- **No Action.** Maintain status quo at each site. All facilities would be maintained, or upgraded to meet safety and security standards.
- **Downsize-in-place.** No duplication of capability within a given site, but there may be duplication from site to site—phase out aging and unused facilities.
- **Consolidate ETF capabilities at one site (NTS or SNL/NM).** Would entail closings at sites not selected and construction of new facilities if NTS were selected. This alternative also includes an option to move the LLNL Building 334 ETF capabilities and the LLNL Site 300 Building 834 Complex to Pantex.

3.12.1 No Action Alternative

Under the No Action Alternative, NNSA would maintain the status quo at each existing site. Only those upgrades and maintenance required to meet safety and security standards would take place. ETFs are located at three national laboratories (SNL/NM, LANL, and LLNL) and NTS. It should be noted that ETF laboratories and capabilities also exist at Pantex and SRS. These facilities, however, are not involved in the R&D or weapon system/component design and qualification process, but instead, utilize ETF capabilities as an integral part of the production/certification process. Without these ETF capabilities, these sites could not complete their missions. Accordingly they have not been included in this analysis. Table 3.12.1-1 lists the existing ETF facilities at the three NNSA laboratories and the NTS.

Table 3.12-1—ETFs at LANL, SNL/NM, LLNL, and NTS

Facility	Size (ft^2)
LANL	
K Site Environmental Test Facility	8,452
Weapons Component Test Facility	22,075
Thermo-Conditioning Facility (5 structures)	6,795
PIXY with Sled Track	6,245
Total	**43,567 ft^2**
SNL	
Simulation Tech Lab (HERMES and RHEPP)	56,886
PBFA Saturn and Sphinx	42,052
ACRR and Sandia Pulsed Reactor Facility	13,793
Radiation Metrology Lab`	1,774
Gamma Irradiation Facility	12,514
Low Dose Rate Gamma Irradiation Facility	206
Auxiliary Hot Cell Facility	13,358
Model Validation and System Certification Test Center	18,842
Centrifuge Complex (including outdoor centrifuge)	15,360
Complex Wave Test Facility	3,459
Sled Track Facility	9,368
Light Initiated HE Test Facility	4,138
Aerial Cable Facility and Control Building	6,808
Radiography Building and Nondestructive Test Facility	6,397
Photometrics/Data Acquisition Complex	13,079
Mechanical Shock Facility	6,600
Mobile Guns Complex	2,400
Thermal Test Complex	15,712
Vibration Acoustics and Mass Properties Lab	8,950
Engineered Sciences Experimental Facility	19,416
Component Environmental Test & Advanced Diagnostic Facility	44,091
Electromagnetic/Environ./Light Strategic Def	103,185
SNL/California Environmental Test Complex	65,964
Total	**484,352 ft^2**
LLNL	
Dynamic Testing Facility (836 Complex)	12,913
Thermal Test Facility (834 Complex)	4,289
Hardened Engineering Test Bldg (334 in Superblock)	6,300
Total	**23,502 ft^2**
NTS	
Device Assembly Facility Area (ETF Portion only)	4,790
U1a Complex (Above ground portion only)	2,100
Total	**6,890 ft^2**
Complex Total	**558,311 ft^2**

3.12.1.1 *Environmental Test Facilities at LANL*

LANL has four primary ETFs located within three different Tech Areas: (1) the K Site Environmental Test Facility (ETF); (2) the Weapons Component Test Facility, (3) the Thermo-Conditioning Facility; and (4) the Pulsed Intensive X-Ray Facility (PIXY) with Sled Track. The K Site is a large complex consisting of eleven major structures and is located at TA-11. The total size of all facilities at the K Site is 8,452 square feet. Both the Weapons Component Test Facility and the Thermo-Conditioning Facility are located at TA-16. Together these two facilities total 28,870 square feet. The PIXY facility is a 6,245 square feet facility located on 194 acres at TA-36. In all the ETF structures at LANL total 43,567 square feet and are operated by a staff of about 30. A description of these facilities is contained in Appendix A.

3.12.1.2 *Environmental Test Facilities at LLNL*

LLNLs ETF program is conducted in three separate facilities: (1) Building 334 (also referred to as the Hardened Engineering Test Building); (2) Building 834 Complex at Site 300; and (3) Dynamic Testing Facility (836 Complex) at Site 300. These three facilities consist of a total area of 23,502 square feet occupying a total site area of seventeen and three quarter acres. There is not a specific and dedicated crew of test technicians or engineers assigned to any of the individual test facilities at LLNL. The Weapons Test Group (WTG), which operates the ETF facilities, has stewardship to maintain all the facilities and provides support staff to the appropriate building in order to conduct and complete the necessary testing. The WTG has a total of 6 workers to support the three LLNL ETF facilities. A description of the LLNL ETF facilities is contained in Appendix A. Figure 3.12-1 shows some of the ETF capabilities in Building 334.

Figure 3.12-1—Photos of Building 334, Hardened Engineering Test Building (left to right): view of environmental test facilities bay and view of INRAD bay

3.12.1.3 *Environmental Test Facilities at SNL/NM*

SNL/NM has twenty-two major ETF complexes, each with multi-operational capability. In all, these facilities have a combined area of 418,388 square feet. These facilities consist of accelerator facilities, radiation testing facilities, a drop tower complex, and a number of other shake, bake, rattle, and roll type laboratories used as part of the SNL/NM mission of support of the SSP, non-nuclear component design and certification, and system engineering and qualification. SNL/NM has a mobile gun complex, an aerial drop tower complex, a rocket-sled, a centrifuge complex, an irradiation facility, a hot cell facility, and a number of other facilities which can subject weapons, weapons components, and associated components to the entire spectrum of electric, radioactive, thermal and other such insults necessary to determine design, performance, and surveillance parameters. Approximately 224 employees are involved in the SNL/NM ETF effort. Besides testing nuclear weapons, SNL/NM has the added responsibility to provide assurance that all nuclear warhead use-control equipment, shipping containers, transportation vehicles and handling equipment meet the performance requirements dictated by the Military Characteristics and can survive the normal, abnormal, and hostile environments described within the Stockpile-to-Target-Sequence requirements documents. Figure 3.12-2 shows a drop tower facility at SNL/NM. A description of the SNL/NM ETF facilities is contained in Appendix A.

Figure 3.12-2—Drop Tower Facility at SNL/NM

3.12.1.4 *Environmental Test Facilities at NTS*

NTS has two Environmental Test Facilities, the Device Assembly Facility (DAF) and the U1a Complex (Figure 3.12-3). Together, these two facilities occupy a floor-space of 6,890 square feet. It should be noted the U1a Complex is an underground facility with only the small portion of the total facility size included in this number. Both DAF and the U1a Complex are considered "user facilities," operated by LLNL and LANL, respectively, on behalf of the NNSA with support from the site Management and Operations (M&O) contractor, primarily in the area of facility maintenance. Under this concept, the facilities are maintained in a "warm standby" condition ready to accept programmatic work. The assigned personnel maintain the facility, its authorization basis, and ensure that programmatic work is properly authorized. The actual programmatic work is conducted by project teams that deploy to the facility to conduct their activities. Thus, staffing levels presented here, only reflect the personnel required to maintain the facility in a "warm standby" condition and not programmatic work. Fully staffed, both facilities would employ 170. Current employment to maintain "warm standby" is 107. A description of these two ETF facilities is contained in Appendix A.

Figure 3.12-3—U1a Complex Environmental Test Facility at NTS

3.12.2 Downsize in Place Alternative

Under the Downsize in Place Alternative, facilities which are duplicative, in need of major upgrades to enable continued operations, or no longer used would be closed. The facilities that would close as a result of this Alternative are shown in Table 3.12-2.

Table 3.12-2—ETF Closures for Downsize in Place Alternative

LANL	LLNL	Sandia National Labs
Thermo-Conditioning Facility (5 structures)	Building 836 Complex	Sandia Pulsed Reactor Facility[1]
PIXY	Building 834 Complex	Low Dose Rate Gamma Irradiation Facility
		Auxiliary Hot Cell Facility
		Centrifuge Complex
		SNL/CA Environmental Test Complex[2] (4 structures)

Source: NNSA 2007.
[1]The reactor, itself has been moved to NTS
[2] These buildings might not be demolished and undergo D&D, but would be reused for other purposes.

The scheduled closure of SNL facilities in Table 3.12-2 is contingent on completion and phasing of existing programmatic work at the sites. The Auxiliary Hot Cell Facility is currently planned to be used thru 2017 to continue the removal and de-inventory of Category III SNM at SNL/NM. The Downsize-In-Place Alternative would not effect the SNL/CA facilities

The Low Dose Gamma Irradiation Facility would be maintained to support the nuclear weapons program mission for characterization of long term exposure of nuclear weapons components and satellite components and would be placed in cold standby if not required or until an alterative capability is operational.

SNM associated with the Sandia Pulsed Reactor material as well as the reactor, itself, was transferred to NTS. Further D&D of the infrastructure is dependent upon the successful demonstration of the Qualification Alternatives for Sandia Pulsed Reactor (QASPR) project.[41] However, timing of D&D of the reactor facility and infrastructure is dependent on proven success of QASPR to ensure minimal risk to the NNSA Office of Defense Programs. The reactor facility and infrastructure at the site also support the national nuclear criticality safety program as well as engineering data requirements for the Yucca Mountain Project, and D&D would be scheduled after this time in conjunction with the QASPR project schedule.

3.12.3 Alternative to Consolidate ETF Capabilities at One Site (NTS or SNL/NM)

There are two options for an alternative to consolidate all major ETF capabilities to one site. One option would consolidate ETF capabilities to the NTS. This option would close ETFs at LANL, LLNL, and SNL/NM and require construction of new facilities at NTS to replace some of the capabilities lost through closures. The two ETFs at NTS at the DAF and the U1a Complex would remain in operation. The Engineered Test Bay (Building 334) at LLNL, Building 834 Complex at LLNL Site 300, and three of the facilities at SNL/NM (considered to be capabilities critical to the continuance of the ETF Program) would remain open until the replacement facilities at NTS are operational. A listing of the facilities that would close as a result of this Alternative is shown in Table 3.12-3.

Table 3.12-3—ETF Closures for the NTS Consolidation Alternative

LANL	LLNL	Sandia National Lab
K Site Environmental Test Facility	Building 834 Complex	Centrifuge Complex (8 structures)
Weapons Component Test Facility	Dynamic Testing Facility (836 Complex)	Auxiliary Hot Cell Facility
Thermo-Conditioning Facility (5 facilities)	Building 334	Low Dose Rate Gamma Irradiation Facility
PIXY		ACRR and Sandia Pulsed Reactor Facility[1]

[41] The demonstrated ability of QASPR to apply modeling and simulation to predict the response of weapon components to meet weapon reliability criteria is the planned solution for future weapons component analysis. See SNL 2008 for more information relative to the QASPR.
(http://www.sandia.gov/pcnsc/research/research-briefs/2007/QASPR_Science_in_the_Physical,_Chemical,_and_Nano_Sciences_Center_-_Overview_by_S._M._Myers.pdf

Table 3.12-3—ETF Closures for the NTS Consolidation Alternative (continued)

LANL	LLNL	Sandia National Lab
		Simulation Tech Lab (HERMES and RHEPP)
		PBFA Saturn and Sphinx
		Radiation Metrology Lab
		Gamma Irradiation Facility
		25 Foot Centrifuge
		Model Validation and System Certification Test Center
		Complex Wave Test Facility
		Light Initiated HE Test Facility
		Sled Track Facility
		Aerial Cable Facility and Control Building
		Radiography Building and Nondestructive Test Facility
		Mobile Guns Complex
		Thermal Test Complex
		Vibration Acoustics and Mass Properties Lab
		Engineered Sciences Experimental Facility
		Component Environmental Test & Advanced Diagnostic Facility
		Electromagnetic/Environmental/Light Strategic Defense Facility
		SNL/CA Environmental Test Complex (4 structures)

Source: NNSA 2007.
[1]The reactor, itself has been moved to NTS

The alternative to consolidate ETF capabilities at NTS would require the construction of five new facilities at NTS: (1) an ACRR-like facility (replacing SNM testing capability lost at SNL); (2) an Engineering Test Bay (ETB) (replacing LLNL's Building 334, a required capability); (3) an Aerial Cable Test Facility (replacing capability lost at SNL); (4) a Building 834 Complex (replacing LLNL Site 300 Building 834 Complex); and (5) a sled track (replacing a required capability lost at LANL and SNL), which could be constructed above or below ground. A description of these new facilities and assessment of the environmental impacts of constructing and operating these facilities is contained in Section 5.17.4.1.4.

A second option would consolidate ETF capabilities at SNL/NM. This alternative would close ETFs LANL and LLNL, but would continue operations of the two ETFs at NTS and some of the existing facilities at SNL/NM. Under this alternative, the ETF activities in Building 334 at LLNL and at Building 834 Complex at LLNL Site 300 would be transferred to either NTS (as discussed above) or to Pantex (see Section 3.12.4). A listing of the facilities that would close is found in Table 3.12-4.

Table 3.12-4—ETF Closures for the SNL Consolidation Alternative

LANL	LLNL	Sandia National Lab
K Site Environmental Test Facility	Building 834 Complex	ACRR and Sandia Pulsed Reactor Facility [1]
Weapons Component Test Facility	Dynamic Testing Facility (Building 836 Complex)	Low Dose Rate Gamma Irradiation Facility
PIXY with Sled Track	Building 334	Auxiliary Hot Cell Facility
Thermo-Conditioning Facility		SNL/CA Environmental Test Complex (4 structures)[2]

[1]The reactor, itself has been moved to NTS
[2]SNL/CA Environmental Test Complex is a Sandia National Laboratory run program near LLNL in California. For environmental impacts, SNL/CA facilities are included in LLNL analysis since this is where the majority of the impacts are incurred.
Source: NNSA 2007.

The scheduled closure of SNL facilities in Table 3.12-4 would be contingent upon completion and time phasing of existing programmatic work at the sites, as previously discussed in Section 3.12.2.

3.12.4 ETF Pantex Option

As an option for the consolidation alternatives discussed in Section 3.12.3, this SPEIS considers the transfer of LLNL ETF activities to Pantex. As discussed in Section 3.12.3, consolidation to one site would require the construction of several new facilities. One such facility is a Building 334-like facility to allow for critical activities presently being conducted at Building 334 (also known as the Hardened Engineering Test Building) at LLNL. Another such facility is Building 834 Complex at LLNL Site 300. The Building 834 Complex is used for thermal and humidity testing of weapons components and systems and can accommodate HE detonations of up to 200 pounds. As an alternative to constructing this new Building 334-like facility and the Building 834 at NTS, an additional option would be for equipment presently located at Building 334 and at the Building 834 Complex to be relocated to Pantex.

Pantex presently conducts activities that are similar to those being conducted at Building 334 and the Building 834 Complex, although not with SNM. As part of its ongoing modernization efforts, Pantex is currently planning the construction of a Weapons Surveillance Facility (WSF), which would replace the existing facility where these operations are conducted. Under this option, the ETF work presently being conducted at LLNL Building 334 and at the Building 834 Complex would be transferred to the WSF. No new construction or additional security considerations would be required for this option.

3.13 SANDIA NATIONAL LABORATORIES, CALIFORNIA (SNL/CA), WEAPONS SUPPORT FUNCTIONS

This section describes the alternatives for SNL/CA Weapons Support Functions alternatives. The affected environments for sites involved in this action are presented in Sections 4.2 (SNL/CA) and 4.6 (SNL/NM). The environmental impacts of the alternatives are presented in Section 5.17. Section 3.16 contains a summary of the environmental impacts of the SNL/CA Weapons Support Functions alternatives. Together, these sections provide the environmental impact information for the SNL/CA Weapons Support Functions alternatives.

Introduction. In 1956, SNL established the SNL/CA facility to design non-nuclear components in support of the Lawrence Livermore National Laboratory's (LLNL) design work. SNL/CA evolved into an engineering research and development laboratory by the early 1960s and into a multi-program engineering and science laboratory during the 1970s. The SNL/CA facilities at Livermore consist of 72 buildings, including laboratories and offices. Major facilities include Building 910, Building 914, Building 916, Building 927, the Micro and Nano Technologies Laboratory (MANTL), and the Distributed Information Systems Laboratory (DISL). Section 3.13.1 discusses the No Action Alternative, which would continue operations at the existing facilities at SNL/CA. Section 3.13.2 discusses the alternative that would transfer the weapons support functions to SNL/NM. The analysis of the environmental impacts of the alternatives is in Section 5.18.

SNL/CA Weapons Support Functions
• **No Action.** Maintain current non-nuclear component design and engineering work at SNL/CA with SNL personnel
• **Consolidate SNL/CA non-nuclear component design and engineering work at SNL/NM**

3.13.1 No Action Alternative

Under the No Action Alternative, NNSA would continue to conduct the existing weapons non-nuclear component design and engineering work at the SNL/CA facilities as shown in Figure 3.13-1. A description of the major SNL/CA facilities is as follows:

Building 910. Building 910 is used to conduct weapons research and development (R&D) activities. The facility conducts science-based engineering and technology R&D in a wide variety of sciences including advanced electronics prototype and development, surface physics, neutron detector research, and telemetry systems. Building 910 is a low-hazard non-nuclear facility that consists of offices and space for weapons test assembly work. It is a multistory steel frame masonry structure of approximately 89,000 square feet, of which 48,000 square feet is laboratory and office space. The following spaces are located in the facility:

- Lobby;
- 128 offices;
- Loading dock (provides gas bottle storage area);
- Large liquid nitrogen tank; and
- 35 primary research and development light laboratories.

Generally, the activities are focused on electronics and microelectronics prototypes. Materials that are studied include ceramics, semiconductors, organic polymers, and metals. Specific activities include:

- Advanced electronics prototype and development;
- Surface physics;
- Neutron detector research; and
- Telemetry systems research and development.

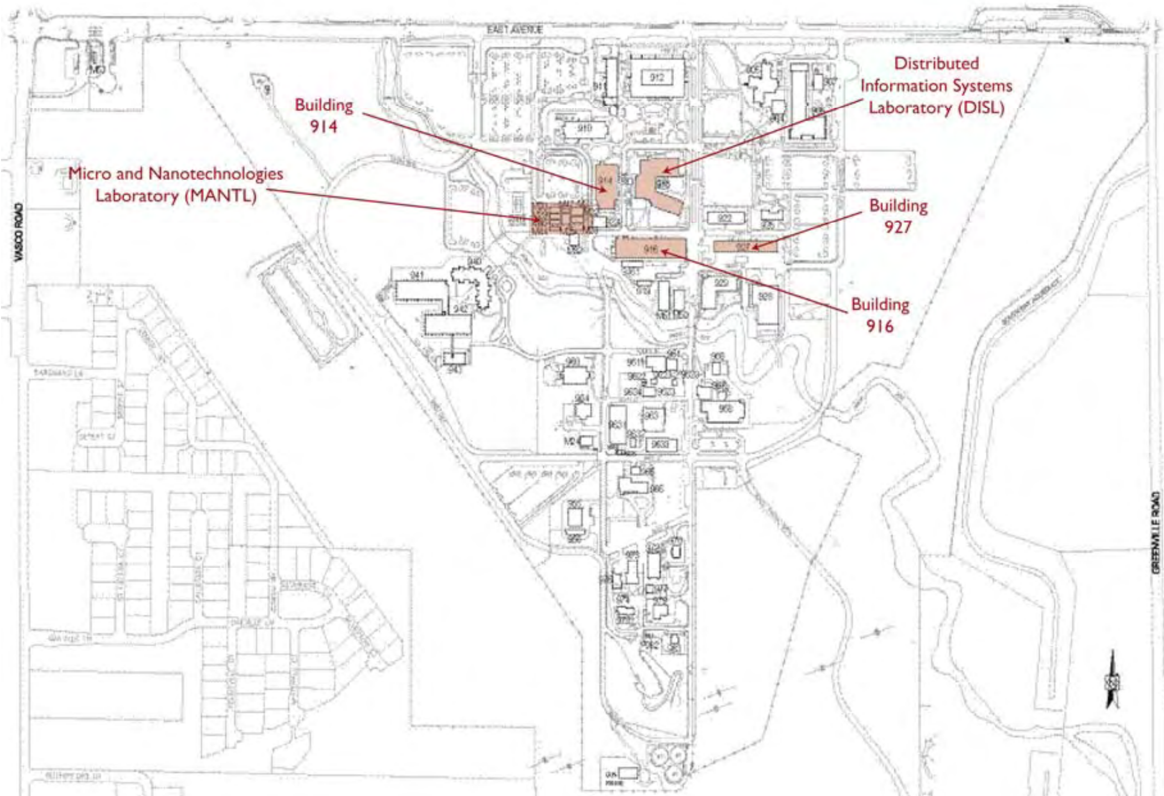


Figure 3.13-1—SNL/CA Weapons Support Facilities

Building 914. Building 914 is used to conduct weapons test assembly and machine shop activities. The facility supports SNL/CA's primary mission of ensuring that the U.S. nuclear weapons stockpile is safe, secure, and reliable. Building 914 is a low-hazard non-nuclear facility that consists of offices and laboratory space for weapons test assembly work. It is a single-story, steel frame masonry structure of approximately 25,000 square feet, of which 19,000 square feet is laboratory and office space. The following spaces are located in the facility:

- 17 offices;
- 4 electronic laboratories;
- 1 large machine shop;
- 1 high-bay test assembly; and
- Several small utility, vault, and storage rooms.

The operations conducted at Building 914 generally are focused on two distinct capabilities that support the mission of U.S. nuclear weapons stockpile maintenance: machine shop activities and test assembly operations.

Building 916. Building 916 is used to conduct materials chemistry R&D activities. Areas of research include thin film interface science, mechanics, ion implantation, gases in metals, hydrogen storage, plasma, annealing, detectors, science-based modeling, microsystems, and fluidics. Building 916 is a low-hazard non-nuclear facility that consists of offices and laboratory space for research and development activities. It is a single story building of approximately 42,000 square feet, of which 32,000 square feet is laboratory and office space. The following spaces are located in the facility:

- Lobby;
- Conference room;
- 53 offices;
- Loading dock (provides gas bottle storage area);
- Large liquid nitrogen tank; and
- 22 primary research and development light laboratories.

Generally, the activities are focused on materials studies including chemical and physical properties and characteristics (phases). Materials that are studied include ceramics, semiconductors, organic polymers, and metals. A wide variety of capabilities are employed in areas of material science, lithography, surface analysis, electronics, and microsystems engineering.

Building 927. Building 927 is used to store small quantities of nuclear and classified materials, assemble sub-systems, conduct system verification, and store equipment. No testing with explosives or other hazardous materials is conducted at this location. Building 927 is a low-hazard facility. It consists of a single story warehouse of approximately 22,000 square feet. The building provides a safeguard storage facility for special materials. Building 927 has four operations:

- Nuclear Material Control;
- Classified Material Control
- Assembly test facility; and
- Storage.

Micro and Nanotechnologies Laboratory (MANTL). The mission of the MANTL (Buildings 940, 941, 942, and 943) is to develop and integrate manufacturing technology to produce micro- and nano-products. MANTL is a low-hazard non-nuclear facility complex that consists of an administrative building and three separate laboratory buildings. All of the buildings are of steel-framed masonry construction, and total approximately 85,000 square feet. The following facilities are located in the complex:

- 22,778 square foot administrative building including lobby, offices, and a small auditorium;

- 30,218 square foot building with primary research and development light laboratories;
- 25,740 square foot building with primary research and development light laboratories; and
- 7,182 square foot building with primary research and development light laboratories.

MANTL activities include a wide variety of operations micro-machining, miniature component fabrication, fuel cell research and development, and sensors and signal processing. Areas of materials research and development include characterization, chemistry, composite and lightweight components, engineered materials (welding, brazing, and joining), science-based modeling, and radiography. Specific operations include materials evaluation laboratories, materials synthesis and processing laboratories, microsystems processing laboratories, and nanolithography equipment development. MANTL has 10 areas of capabilities:

- Integrated Manufacturing;
- Microsystems;
- Fuel Cell Prototyping;
- Materials Characterization;
- Materials Chemistry;
- Lightweight Components;
- Engineered Materials;
- Science-Based Modeling;
- Sensors; and
- Radiography.

Distributed Information Systems Laboratory (DISL). The DISL (Building 915) provides research and development in areas of distributed information systems. The new facility is a state-of-the-art, two-story structure containing approximately 70,400 square feet; housing offices, computer laboratory space, research and development space, and collaborative group areas. The space is divided into the following:

- 12,000 square feet of computer laboratory space;
- 17,650 square feet of research and development space;
- 4,730 square feet for collaborative group areas;
- 8,220 square feet for support areas;
- Ancillary laboratories; and
- Secure vault-type rooms.

DISL operations focus on the following technologies:

- Secure networking;
- High performance distributed computing;
- Visualization and collaboration technologies; and
- Design and manufacturing of productivity environments.

Laboratory activities consist primarily of connecting off-the-shelf hardware components into multimedia and network systems, computer model development, testing and validation, and distributed computing.

3.13.2 Move Activities to SNL/NM

This alternative would move some or all of the weapons non-nuclear component design and engineering work to SNL/NM where it would be consolidated with similar ongoing weapons activities presently being conducted there. The majority of the buildings at SNL/CA are in good repair and could be occupied by other programs. No new construction would be expected at SNL/NM, as existing facilities could accept all personnel and equipment associated with this move to SNL/NM.

3.14 POTENTIAL CHANGES AT ALTERNATIVE SITES

This section presents a summary of the potential actions, displayed by site, which could occur based upon the alternatives presented in Sections 3.3 through 3.12. The purpose of this section is to provide a convenient format to understand the range of actions that could occur at each site potentially affected by the Complex Transformation SPEIS proposed action and alternatives.

3.14.1 Los Alamos National Laboratory

Programmatic Alternatives

- Continue current activities (Section 3.3.1)
- Be selected for a Greenfield CPC (Section 3.4.1) or Upgrade (Section 3.4.1.6.1) or 50/80 (Section 3.4.1.6.2)
- Be selected to receive the CNPC (Section 3.5.1) or CNC (Section 3.5.2) and Category I/II SNM from other sites (Section 3.5.1.3)
- Receive Category I/II SNM from LLNL (Section 3.7.2)
- If Los Alamos is not selected for CPC, phase-out plutonium manufacturing capability and transfer all Category I/II SNM to CPC site (Section 3.4.1.4)
- Establish a Capability Based pit production capacity (Section 3.6.1.1)

Project-Specific Alternatives

- Continue current activities related to Category I/II SNM storage (Section 3.7.1), HE R&D (Section 3.8.1), Tritium R&D (Section 3.9.1), Hydrotesting (Section 3.11.1), and ETFs (Section 3.12.1)
- Transfer HE R&D activities to other sites (Section 3.8.2)
- Receive HE R&D activities from other sites (Section 3.8.2)
- Transfer tritium R&D activities to SRS (Section 3.9.2)
- Receive tritium R&D activities from SRS and LLNL (Section 3.9.3)
- Reduce tritium R&D activities in place (Section 3.9.4)
- Reduce hydrotesting facilities in place (Section 3.11.2.1)
- Consolidate hydrotesting mission at LANL (Section 3.11.2.2)
- Consolidate ETFs in place (Section 3.12.2)
- Transfer ETFs to SNL/NM or NTS (Section 3.12.3)

3.14.2 Lawrence Livermore National Laboratory

Programmatic Alternatives

- Continue current activities related to Category I/II SNM storage (Section 3.7.1)
- Transfer Category I/II SNM to other sites (Section 3.7.2)

Project-Specific Alternatives

- Continue current activities related to HE R&D (Section 3.8.1), Tritium R&D (Section 3.9.1), Hydrotesting (Section 3.11.1), and ETFs (Section 3.12.1)
- Transfer HE R&D activities to other sites (Section 3.8.2)
- Receive HE R&D activities from other sites (Section 3.8.2)
- Transfer tritium R&D activities to SRS (Section 3.9.2)

- Transfer tritium R&D activities to LANL (Section 3.9.3)
- Reduce tritium R&D activities in place (Section 3.9.4)
- Reduce hydrotesting facilities in place (Section 3.11.2.1)
- Transfer hydrotesting mission to LANL (Section 3.11.2.2)
- Consolidate ETFs in place (Section 3.12.2)
- Transfer ETFs to SNL/NM or NTS (Section 3.12.3)
- Perform Category III SNM operations on material originating from LANL facilities (Section 3.7.2)

3.14.3 Nevada Test Site

Programmatic Alternatives

- Continue current activities (Section 3.3.1)
- Be selected for a Greenfield CPC (Section 3.4.1)
- Be selected to receive the CNPC (Section 3.5.1) or CNC (Section 3.5.2) and Category I/II SNM from other sites (Section 3.5.1.3)
- Receive Category I/II SNM from LLNL for interim storage (Section 3.7.2)

Project-Specific Alternatives

- Continue current activities related to HE R&D (Section 3.8.1), Hydrotesting (Section 3.11.1), and ETFs (Section 3.12.1)
- Receive HE R&D activities from other sites (Section 3.8.2)
- Receive NNSA flight test operations
- Be the M&O contractor for campaign mode flight test operations
- Reduce hydrotesting facilities in place (Section 3.11.2.1)
- Transfer hydrotesting mission to LANL (Section 3.11.2.2)
- Receive consolidated hydrotesting missions (next generation) (Section 3.11.2.3)
- Consolidate ETFs in place (Section 3.12.2)
- Consolidate ETFs to NTS (Section 3.12.3)

3.14.4 Pantex Plant

Programmatic Alternatives

- Continue current activities (Section 3.3.1)
- Be selected for a Greenfield CPC (Section 3.4.1)
- Be selected to receive the CNPC (Section 3.5.1) or CNC (Section 3.5.2) and Category I/II SNM from other sites (Section 3.5.1.3)
- Transfer Category I/II SNM storage from Zone 4 to Zone 12 (Section 3.7.2)
- Transfer A/D/HE activities to another site if a site other than Pantex is selected for CNPC/CNC; Pantex would close and undergo D&D (Section 3.5)
- Establish a Capability Based Assembly/Disassembly/HE Production (Section 3.6.1.2)

Project-Specific Alternatives

- Continue current HE R&D activities (Section 3.8.1), and Hydrotesting (Section 3.11.1)
- Transfer HE R&D activities to other sites (Section 3.8.2)
- Receive HE R&D activities from other sites (Section 3.8.2)

- Receive ETF Mission from LLNL Building 334 and, Building 834 Compex (Section 3.12.4)

3.14.5 Sandia National Laboratories/NM

Programmatic Alternatives
- None

Project-Specific Alternatives
- Continue current activities related to HE R&D (Section 3.8.1), Tritium R&D (Section 3.9.1), Hydrotesting (Section 3.11.1), and ETFs (Section 3.12.1)
- Transfer HE R&D activities to other sites (Section 3.8.2)
- Receive HE R&D activities from other sites (Section 3.8.2)
- Reduce hydrotesting facilities in place (Section 3.11.2.1)
- Consolidate ETFs in place (Section 3.12.2)
- Consolidate ETFs to SNL/NM or NTS (Section 3.12.3)
- Receive SNL/CA Weapons Support Functions (Section 3.13)

3.14.6 Savannah River Site

Programmatic Alternatives
- Continue current activities (Section 3.3.1)
- Be selected for a Greenfield CPC (Section 3.4.1)
- Be selected to receive the CNPC (Section 3.5.1) or CNC (Section 3.5.2) and Category I/II SNM from other sites (Section 3.5.1.3)
- Establish a Capability Based tritium production capacity (Section 3.6.1.4)

Project-Specific Alternatives
- Continue current activities Tritium R&D (Section 3.9.1)
- Receive tritium R&D activities from LLNL and LANL (Section 3.9.2)
- Transfer tritium R&D activities to LANL (Section 3.9.3)
- Reduce tritium R&D activities in place (Section 3.9.4)

3.14.7 Tonopah Test Range

Programmatic Alternatives
- None

Project-Specific Alternatives

- Continue current activities related to NNSA Flight testing (Section 3.10.1)
- Upgrade TTR (Section 3.10.2)
- Operate TTR in Campaign Mode (Section 3.10.3)
- Transfer NNSA Flight Testing to WSMR (Section 3.10.4)
- Transfer NNSA Flight Testing to NTS (Section 3.10.5)

3.14.8 Y-12

Programmatic Alternatives
- Continue current activities (Section 3.3.1)
- Be selected for a Greenfield CPC (Section 3.4.1)
- Be selected to receive the CNPC (Section 3.5.1) or CNC (Section 3.5.2) and Category I/II SNM from other sites (Section 3.5.1.3)
- Transfer Enriched Uranium operations to another site if a site other than Y-12 is selected for CNPC/CNC; Y-12 would close and undergo D&D (Section 3.5)
- Establish a Capability Based Enriched Uranium operations (Section 3.6.1.3)

Project-Specific Alternatives
- None

3.14.9 White Sands Missile Range

Programmatic Alternatives
- None

Project-Specific Alternatives
- Continue current activities (Section 3.2.7)
- Receive NNSA Flight Testing Mission from Tonopah Test Range (Section 3.10.4)

3.14.10 Sandia National Laboratories/CA

Programmatic Alternatives
- None

Project-Specific Alternatives
- Transfer Weapons Support Functions to Sandia National Laboratories/NM (Section 3.13)

3.15 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

NNSA considered alternatives other than those presented in Sections 3.3 through 3.13. NNSA concluded, however, that these alternatives were not reasonable and eliminated them from detailed analysis. This section identifies the alternatives that were considered but eliminated from detailed study, and discusses the reasons why they were eliminated.

Consolidate the three nuclear weapons laboratories (LLNL, LANL and SNL). The three weapons laboratories possess most of the nation's core intellectual and technical competencies in nuclear weapons. The laboratories perform the basic research, design, engineering, testing, and certification of weapon performance. Two of the laboratories (LANL and LLNL) focus on the weapons physics package and the third (SNL) focuses on non-nuclear components and systems engineering. In 1995, President Clinton concluded that the continued vitality of all three laboratories was essential to the nation's ability to fulfill the requirements of stockpile stewardship in the absence of underground testing (White House 1995). More recently, the Secretary of Energy Advisory Board Task Force on the Nuclear Weapons Complex of the Future (SEAB 2005) affirmed that three design laboratories are currently needed to certify nuclear weapons without underground testing. As a result of the continuing challenges of certification without underground testing, the need for robust peer review, benefits of intellectual diversity from competing physics design laboratories, and uncertainty over the details future stockpiles, NNSA does not consider it reasonable to evaluate laboratory consolidation at this time. While this conclusion has not changed, NNSA continues to make the laboratories more efficient and effective, as indicated by the alternatives to consolidate, relocate, or eliminate duplicative facilities and programs.

Pursue dismantlement and refrain from designing and building new nuclear weapons. Dismantlement coupled with no capabilities to design and build new nuclear weapons was not evaluated because it is not consistent with maintaining a safe, secure, and reliable nuclear weapons stockpile over the long-term. This SPEIS assesses reasonable alternatives for maintaining a nuclear weapons stockpile. The alternatives include actions to continue dismantlement consistent with Presidential direction to reduce the nuclear weapons stockpile. However, all of the alternatives would maintain weapons design, R&D, and manufacturing capabilities because these are necessary to maintain the stockpile.

This SPEIS includes two options for a Capability-Based Alternative (Sections 3.6.1 and 3.6.2) that would support a stockpile much smaller than currently planned, and a discussion of how the reasonable alternatives might be adapted if the President were to direct even further reductions in the stockpile (Section 3.6.3). The No Net Production/Capability-Based Alternative (Section 3.6.2) would require the production of a limited number of components and assembly of weapons beyond those associated with supporting surveillance, but would not result in the addition of new types or increased numbers of weapons to the total stockpile.

Curatorship Alternative. This programmatic alternative was proposed during public scoping meetings and later public meetings on the Draft SPEIS. The written comments submitted made reference to a document that provides a description of *curatorship* as a strategy for managing the

Stockpile Stewardship Program (SSP) and the description that follows is excerpted from that report.[42]

> ***Curatorship.*** *This option is based upon reliance on the surveillance and non-nuclear testing program to determine when repairs are necessary to nuclear weapons. Only if there is compelling evidence that components have degraded, or will soon degrade, and could cause a significant loss of safety or reliability, would DOE replace the affected parts with new ones that would be remanufactured as closely to their original design as possible. A core philosophy of this approach is that absent detectable changes, the well designed and thoroughly tested warheads in the stockpile will remain as safe and reliable as the laboratories have certified them to be today. No separate action would be taken to recertify each warhead annually. This places a heavy responsibility on the surveillance and testing program to assure timely warning of any problem that could materially impair a significant fraction of the nuclear weapons stockpile.*
>
> *Under the Curatorship Option, DOE would take a very cautious approach to making any changes to the weapons in the current stockpile. The approach is like that of a museum curator, whose first priority is to preserve the pieces under his charge and only restore them if they suffer unacceptable degradation. DOE would make the minimum number of changes to warheads in the stockpile that are believed necessary to maintain current levels of safety and reliability. Nuclear explosive components would be remanufactured and replaced only when there is compelling evidence from the surveillance and testing program that they have degraded, or will soon degrade, to a degree that will cause a significant loss of performance. Then, DOE would replace such components with others as close to the originals as possible, and always meeting the specifications previously associated with adequate nuclear performance. Non-nuclear components would be replaced only when detected degradation threatens to impair safety or weapon reliability. The burden of proof would be on those in the surveillance program to demonstrate that a component must be replaced to maintain historical levels of confidence in safety and reliability. No attempts at improving performance in either of these areas would be made.*
>
> *DOE would support state-of-the-art testing and engineering capabilities to examine components. It would retain sufficient scientific and computing capabilities to apply current models and normal evolutionary improvements in analytical models to appraise potential problems with weapons systems. Weapons design and development capabilities would be allowed to atrophy, however, and most of DOE's weapons related research and experimentation programs would be suspended. Existing manufacturing capabilities would be retained and facilities would be refurbished only as needed to remanufacture components to previous designs. Changes in materials and production techniques would be limited to those dictated by environmental, health, and safety requirements, or by the unavailability at reasonable cost of products and processes used in a component's original manufacturing process. The*

[42] Managing the U.S. Nuclear Weapons Stockpile—A Comparison of Five Strategies, A Report for Tri-Valley CAREs by Dr. Robert Civiak, July 2000.

> *production complex would be smaller than under the first two options, since components would be replaced less frequently. Functioning components would rarely be replaced with improved versions.*

This definition of *curatorship* comprises many aspects of NNSA's current Stockpile Stewardship Program. One section of Dr. Civiak's report, i.e., "Assessment of the Options for Managing the U.S. Nuclear Weapons Stockpile," identifies two potential differences between the current SSP and curatorship.

- Unlike the current SSP, curatorship would involve giving up the capabilities to design and develop replacement nuclear weapons.
- Unlike the current SSP, curatorship would involve reduction of NNSA's manufacturing capabilities, as NNSA would rely more on surveillance and remanufacturing and less on production of newly designed components.

The report states that "weapons design and development would be allowed to atrophy" in the suggested curatorship alternative. This statement assumes that there is a significant difference in the technical capabilities needed to maintain the weapons in the legacy stockpile from those required to design new weapons. The technical capabilities of the SSP, such as the experimental and computational capabilities, are largely defined by the technical characteristics of the aging stockpile and the moratorium on nuclear testing. The legacy weapons in the stockpile are not simple in that they were generally designed to provide the maximum nuclear yield within the weight and volume constraints of the delivery vehicle's capabilities. The weapon's nuclear yield, reliability, safety and security characteristics all compete for the same weight and volume capacities. Thus, weapon design is a result of complex "systems engineering" wherein design features affect one another and are traded-off against each other. When a problem is detected or suspected, laboratories must make technical judgments on the nature and extent of the problem and the proposed solution, because they are the ones most technically competent to do so. The concept of science-based stockpile stewardship was developed to enable a more fundamental scientific understanding of legacy weapons for the purpose of making competent judgments about their safety and reliability in the absence of nuclear testing. The technical merit of any particular feature of the SSP, such as a specific experimental capability, will always be subject to uncertainty. Nonetheless, as a whole, the SSP is technically designed for maintenance of the legacy stockpile. Allowing any aspects of this capability to atrophy would impair NNSA's ability to assess and, if necessary, address issues regarding the safety, security, and reliability of a nuclear weapon.

In regard to the second point on surveillance and remanufacture, this aspect of curatorship may not differ significantly from the existing SSP. In practice, the SSP is probably more cautious in making changes to legacy weapons than implied in the definition of curatorship. For example, a number of stockpile problems have been corrected by changes to DoD maintenance, operating or management procedures, thus avoiding the need to return the weapons to NNSA for more complicated and expensive fixes. However, the ability of DoD to repair nuclear weapons is minimal and inherently limited by the weapon's complex design and construction. The thousands of parts in weapons do not function as individual items that can be separately changed out, like an electrical fuse in a home or car. Generally, the weapon has to be returned to Pantex for safe disassembly and replacement of components or subassemblies. In general, there is no practical, safe, or cost effective way to fix individual defects in isolation or just-in-time as implied by curatorship proposals. This is the main reason that legacy "life extension programs" are planned, so as to repair all known or potential problems at one time while the weapons are disassembled.

The No Net Production/Capability-Based Alternative includes many facets of a Curatorship Alternative: (1) not adding new types or increased numbers of weapons to the total stockpile; (2) state-of-the-art testing and engineering capabilities to examine components and detect and appraise problems; and (3) maintaining the capabilities to replace components, as needed.

In summary, a curatorship alternative does not define a programmatic alternative outside the range of alternatives evaluated in this SPEIS.

Smaller CNPC/CUC/CNC/A/D/HE Center Alternative. This SPEIS includes an analysis of Capability-Based Alternatives (Section 3.6) that would produce as few as 10-50 components and assemble 10-50 weapons per year to maintain capability and to support a limited LEP. Additionally, for both the Distributed Centers of Excellence Alternative and Consolidated Centers of Excellence Alternative, this SPEIS considers production of as few as 80 pits per year. Similarly, NNSA also considered whether to assess a smaller CUC, CNC, or CNPC. In determining whether, to assess a smaller CUC, CNC, or CNPC, NNSA considered three different factors-- programmatic risk, cost effectiveness and environmental impacts. These factors are discussed below.

***Programmatic risk*.** Section 2.3.3.2 describes the technical considerations for planning pit production capacity. In summary, current surveillance data and special studies indicate that pits in legacy weapons are aging without significant problems. Also, pit reuse may be a viable way to avoid some new pit production for some weapons, but it cannot be relied on as a complete substitute for new production due to the technical limitations described in Section 2.3.3.2. However, an advantage of pit reuse is that the work could possibly be done at the weapons A/D site in existing facilities. Thus, the increased programmatic risk of planning a lower-than-base-case production capacity for new pits might be judged acceptable. This same kind of judgment about programmatic risk was made for pits in the 1996 SSM PEIS.

Section 2.3.3.3 describes the technical considerations for planning secondary production capacity. In summary, current surveillance data and studies indicate that the secondary components in some legacy weapons are not holding up as well as they age beyond their intended design life. Further, there is no risk mitigating option for secondary components similar to the pit reuse. Secondary components have been disassembled and completely rebuilt in recent life extension programs. For planning purposes, rebuilding a secondary is not significantly different from building a completely new secondary.

Pit and secondary component installation and removal are done at the weapons A/D site, so its planning assumption for production capacity must be at least as high as the higher of the two components. In addition, because the weapons A/D site is the only location for safe disassembly of nuclear weapons, it is unlikely that the base case for this function would be reduced even if pit and secondary component production levels were reduced. It would not be prudent to overly limit this function in the event that weapons needed to be disassembled quickly for some unforeseen reason, not the least of which would be a nuclear safety problem.

Cost effectiveness. If new nuclear production facilities were built for pit or secondary components, lower production capacities are not likely to have a significant effect on the cost of these facilities. The number of pieces of unique equipment and factory floor space required will not change significantly at lower capacity levels. Pit and secondary components both contain SNM and these materials require a substantial factory infrastructure regardless of production rate—an infrastructure needed for compliance with environment, health and safety requirements and nuclear safeguards and security. In addition to facility requirements being similar because of the use of SNM, the uranium and plutonium components use many of the same manufacturing technologies (welding, machine tools, etc.). The lack of sensitivity of facility size and cost to lower production rates is illustrated by an SRS study on pit production capacity (NNSA 2007). The study identified 84 pieces of equipment to produce 75 pits per year, but only 87 pieces of equipment to produce 125 pits per year. This translates into less than a 2 percent difference in the floor space needed for 75 pits per year versus 125 pits per year. Similarly small differences would be expected for smaller production capacities.

In regard to constructing new facilities for the weapon A/D function, the cost sensitivities are different based on the differences in facility design and utilization. Nuclear facilities for SNM processing and component production are very complex and expensive. Weapon A/D facilities are not designed for SNM processing and all that entails. They are designed to mitigate the effects of an accidental detonation of a weapon's high explosive during operations. The construction cost for a weapon A/D type facilities is very much less than the cost of facilities for pit production and secondary component production. Cost would not play a significant role in relation to programmatic risk.

Environmental impacts. Because the square footage of a new pit, secondary, or weapon A/D facility is not very sensitive to changes in production rates between 10 and 125 units per year, the environmental impacts of construction are not expected to be significantly different than for the current alternatives. The environmental impacts of operations estimated in this Final SPEIS are proportional to production rates and bounded on the low side by the impact of the Capability-Based Alternatives.

In conclusion, lower pit production rates may be an acceptable programmatic risk in view of the pit surveillance data, and the existence of a potential pit reuse option and cost. The same is not true for secondary components and weapon A/D functions since recent history on the secondary components indicates there is a higher programmatic risk associated with secondary longevity resulting in a need to work on weapons under the life extension program. The environmental impacts for the secondary component and weapon A/D functions would not change significantly by creating a new alternative based on a planning assumption of 50/80 units per year. Based on this conclusion, NNSA decided to eliminate a smaller CUC[43], CNC, and CNPC from detailed analysis.

[43] As discussed in Section 3.6.2.7, NNSA does consider a "minimum UPF" for the No Net Production/Capability-Based Alternative. Although the "minimum UPF" would be a smaller facility, the facility would not be significantly smaller than the current UPF design.

Regarding the CPC, NNSA identified the following potential alternatives, but eliminated them for the reasons set forth below:

New CPC with a smaller capacity. NNSA considered whether it would be reasonable to build a new CPC with a capacity of fewer than 125 pits per year (single shift). In a detailed report published in September 2007 (NNSA 2007), NNSA concluded that if it constructed a new pit facility with a capacity to produce 80 pits per year, the reduction in square footage would be small (less than a few percent) compared to a new facility designed for 125 pits per year (single shift). The reason for this is that the reduction in the number of equipment processing stations is only 6 stations from the total estimated requirement of 132 major processing stations. Reductions in the processing stations based on a lower production requirement only decreases a small amount of equipment that would be needed to provide production assurances in the capacity increase from 80 pits per year to 125 pits per year (single shift). From a design perspective for a new facility, 125 pits per year plant is an optimal minimum. The expected environmental impacts on construction and operation of a new CPC at 125 pits per year would not be significantly different from 80 pits per year and the larger capacity provides better assurance of meeting the purpose and need for production of pits. This conclusion would also be true for the Capability-Based Alternatives, which evaluates impacts for pit production at capacities of 10-50 pits per year.

Purchase pits. While there is no national policy that prohibits purchase of defense materials such as pits from foreign sources, NNSA has determined that the uncertainties associated with obtaining them from foreign sources render this alternative unreasonable for an assured long-term supply.

Upgrade Building 332 at Lawrence Livermore National Laboratory. Building 332 at LLNL is located in what is known as the "Superblock." This building is a plutonium R&D facility containing a wide variety of plutonium processing and fabrication technologies but offering minimal production capabilities. Activities in Building 332 include demonstrating improved technologies for plutonium metal preparation, casting, fabrication, and assembly; fabrication of components for subcritical tests; surveillance of LLNL pits; support for LANL pit surveillance; and fundamental and applied research in plutonium metallurgy. Building 332 does not have a pit manufacturing mission and is small in comparison to the production facilities at LANL. Additionally, because of the significant population around LLNL, an upgrade alternative at LLNL is undesirable.

Consider other sites for the CPC. In order to determine the reasonable site alternatives for a CPC, all existing, major DOE sites were initially considered as a location for a CPC. Because one of NNSA's main purposes is to consolidate Category I/II SNM, sites that do not maintain Category I/II SNM were eliminated from consideration. Likewise, NNSA eliminated sites that do not conduct major NNSA program activities, as these sites would further expand the NNSA Complex. Other NNSA sites were not considered reasonable locations because they do not satisfy certain criteria such as low surrounding populations, mission compatibility, or synergy with the site's existing mission. Following this process, NNSA decided that Los Alamos, NTS, Pantex, SRS, and Y-12 are the reasonable site alternatives for a CPC (71 FR 61731).

Redesign of weapons to require less or no plutonium. The pits in the nuclear weapons stockpile were designed and built with plutonium, and in an era when nuclear testing was used to verify these designs. Replacing these pits with new ones that would use little or no plutonium (i.e., they would use highly enriched uranium instead of plutonium) for the sole purpose of not building a long-term, assured pit production facility would not be reasonable. Underground testing would likely be required to verify performance of a design that uses uranium instead of plutonium. In addition, these new pits would require costly changes in weapon delivery systems.

Do not produce new pits. The latest studies on pit aging indicate that the pits currently in the stockpile may be viable for more than 85 years. It may become necessary to manufacture new pits for a number of reasons including new weapon design, changes in other components in the weapon that might require a new pit (for example a change in the HE to be used or unavailability of certain materials or components). Prudent management of NNSA's mission dictates that NNSA have the ability to produce all components necessary for the nuclear weapons stockpile to adequately manage all potential risks to the stockpile. However, NNSA has considered a No Net Production/Capability-Based Alternative (Section 3.6.2) that would produce as few as 10 pits per year, which would be the minimum production needed to maintain capability and to support a limited LEP workload.

NNSA flight testing. In addition to the WSMR, NNSA considered three other DoD flight test ranges. A team of NNSA officials visited these sites, discussed their availability and assets with the sites' technical staff and management, and evaluated their ability to conduct NNSA flight test operations. However, as explained below, NNSA eliminated them from further consideration because they are unreasonable from the standpoint of technical risk.

NNSA considered areas B-70 and B-75, on the west side of Eglin Air Force Base. Eglin is one of the Air Force's largest bases, and is a primary test center for non-nuclear munitions. Located on the coast of the panhandle of Florida, the base covers 724 square miles of land, and has 97,963 miles of water ranges in the Gulf. NNSA has conducted discrete flight tests at Eglin in the past and may do so in the future. However, the geological features, including the terrain and short depth to groundwater, present problems for more routine flight tests (e.g., penetration testing, difficult recovery of units after testing). Thus, Eglin would not provide a suitable environment for most flight testing.

NNSA also considered China Lake, an airborne weapons testing and training range operated by the U.S. Navy. It is located in the northeast of California's Mojave Desert in northwestern San Bernardino County. China Lake is the US Navy's largest single holding of land, covering of 1.1 million acres. Although the technical assets at China Lake are sufficient to support NNSA Flight Test Operations, the geology and soils are not considered adequate for testing all gravity weapons.

NNSA also considered the Utah Test and Training Range (UTTR). UTTR is a vast military area in northern Utah, about 70 miles west of Salt Lake City. UTTR is the nation's largest combined restricted land and closed "special use" airspace area. The existing assets, such as optical systems, radar, and communications are all dated and its management has no plans for upgrading or replacing them. Soil composition is moist and soft over the entire range and was not considered suitable for conducting all NNSA Flight Test Operations.

Additionally, in response to public comments on the Draft SPEIS, NNSA considered additional alternatives that would not relocate NNSA's flight test operations from TTR, but would conduct tests at TTR on a campaign basis. This led to the development of three options that are presented in Section 3.10.3.

Tritium R&D alternatives: With the exception of the irradiation of tritium targets (which occurs at the TVA Watts Bar commercial nuclear reactor), all other elements of tritium production are currently conducted at SRS. Tritium production activities are conducted in new, state-of-the-art facilities that were specially designed and built for this mission. There are no existing facilities at sites other than SRS for performing these missions. As such, any proposal to transfer the tritium production mission from SRS was considered to be unreasonable.

Changing tritium missions at SNL/NM. As noted in Section 3.9.1, SNL/NM has very small inventories of tritium in conjunction with its neutron tube target loading. Projected inventories are not expected to increase and will not represent increases to security and infrastructure requirements. Expanding SNL/NM to take on additional tritium R&D missions would require additional increase in infrastructure requirements, limits etc. Thus, for a future mission or decision, this site is essentially equivalent to a "greenfield" site and was considered unreasonable for consolidation activities. Likewise, the programmatic need to conduct neutron tube loading R&D in conjunction with the neutron tube target loading makes transfer of this mission from SNL/NM unreasonable.

Consolidate tritium R&D at LLNL. Although LLNL has a low tritium inventory, the site will be able to accommodate approximately 35 grams of tritium in the near future. The facility infrastructure will support the loading of tritium targets for the NIF. In comparing LLNL's tritium limit and inventories to existing inventories and limits at LANL and SRS, it falls far short of what would be necessary to accommodate these missions. To accommodate the tritium R&D mission, LLNL would need to increase projected tritium limits about 10 fold or slightly higher. As such, LLNL was recommended for consideration as a "donor" site for tritium R&D rather than as a "receiver" site.

Transfer NIF tritium target loading from LLNL. LLNL is in the process of developing a capability to fill tritium targets for NIF experiments. The success of the NIF experiments, particularly to achieve target ignition is very sensitive to impurities in the target. One of these impurities is Helium-3 which accumulates in the target at the rate of 6.4 atomic parts per million per hour from tritium decay. Any tritium consolidation option that moves NIF target tritium loading to a location not colocated with NIF, introduces additional time and handling of the NIF targets before the experiments can be conducted. It seems unlikely targets produced at a site other than at LLNL could be brought to NIF and used in experiments within the time constraints stated for experimental success, particularly since most of the 36 hours is required for target conditioning and characterization at NIF itself. As such, NNSA has concluded that it is unreasonable to transfer the NIF tritium target loading from LLNL.

3.16 COMPARISON OF IMPACTS

Comparison of potential environmental impacts is based on the information in Chapter 4, Affected Environment, and analyses in Chapter 5, Environmental Impacts. Its purpose is to present the impacts of the alternatives in comparative form. For the programmatic alternatives to restructure SNM facilities, Table 3.16–1 (at the end of the chapter) presents a comparison of the potential impacts of construction and operation associated with the No Action Alternative, DCE Alternative, CCE Alternative, and Capability Based Alternative. The No Action Alternative is presented in Table 3.16-1 as a benchmark for comparison of the impacts associated with the action alternatives. Table 3.16-2 presents a summary comparison of the Category I/II SNM Consolidation for LLNL and Table 3.16-3 presents a summary comparison of the Category I/II SNM Consolidation at Pantex.

A detailed analysis of the project-specific alternatives is contained in Section 5.13 (HE R&D), Section 5.14 (Tritium R&D), Section 5.15 (Flight Testing), Section 5.16 (Hydrodynamic Testing), Section 5.17 (Major Environmental Test Facilities), and Section 5.18 (Non-Nuclear Weapons Support Functions at SNL/CA). For the project-specific actions, Tables 3.16-4 through 3.16-8 are provided.

In addition to the comparison presented in Table 3.16-1, this section presents an overview of the major environmental impacts associated with the programmatic alternatives presented in this SPEIS. This presentation is an overview, focusing on the major discriminator between the programmatic alternatives with respect to land use, employment, transportation, and accidents. A detailed analysis of the environmental impacts associated with all alternatives (by site) is presented in Chapter 5, Sections 5.1 through 5.9. A detailed transportation analysis is presented in Section 5.10.

3.16.1 Land Use for Programmatic Alternatives

For land use, both the No Action Alternative and the Capability Based Alternative have the least impacts, in that the total area of the seven Complex sites analyzed in this SPEIS (LANL, LLNL, NTS, Pantex, SNL, SRS, and Y-12) remains the same at approximately 1,000,000 acres.

For the DCE Alternative, the Complex would remain the same size, but a CPC would be constructed at one of five site alternatives. This would disturb an area of approximately 140 acres during construction, resulting in a 110 acre facility within the existing boundaries of one of these sites. For Los Alamos, this disturbed land could be a bit smaller, as an alternative to use existing and planned pit manufacturing facilities is being considered along with a Greenfield CPC alternative. At Y-12, if the UPF were constructed, consolidation from existing facilities could ultimately reduce the area associated with nuclear production activities from 150 acres to approximately 15 acres.

Under the Consolidated Centers of Excellence (CCE) Alternative, the Complex's size could be reduced. Depending upon the option (Consolidated Nuclear Production Center [CNPC] or Consolidated Nuclear Centers [CNC]), this alternative would involve the construction of facilities at one or two sites, and could resulting in a 545-acre facility at one of five candidate sites. If Los Alamos, NTS, or SRS were selected as the site for CCE facilities, both Pantex and Y-12 could be closed. This could reduce the size of the Complex by 16,777 acres. If Pantex (but not Y-12) were selected for CCE facilities, Y-12 could close and the size of the Complex reduced by approximately 800 acres. If Y-12 (but not Pantex) were selected for CCE facilities, Pantex could close and the Complex would be reduced by 15,977 acres.

3.16.2 Impacts on Complex Facilities for Programmatic Alternatives

Under the No Action Alternative, NNSA would continue the trend of closing, replacing, and upgrading older facilities consistent with previous decisions. Surplus facilities with no inherent value to DOE, NNSA, or the community would ultimately be dispositioned or undergo decontamination and decommissioning (D&D). For example, at Y-12, many excess buildings and infrastructure have been closed over the past decade, and approximately 244 buildings, with more than 1.1 million square feet, have been demolished or removed. In the future, as part of the environmental cleanup strategic planning, DOE and NNSA are developing an Integrated Facility Disposition Project (IFDP). The IFDP is a strategic plan for disposing of legacy materials and facilities at Oak Ridge National Laboratory (ORNL) and Y-12 that uses an integrated approach. Under the IFDP, the D&D of approximately 188 facilities at ORNL and 19 facilities at Y-12, as well as the remediation of soil and groundwater contamination there, would occur over the next decade. The IFDP will be conducted as a remedial action under CERCLA. Similar activities at other NNSA sites are ongoing. For instance, at LLNL, approximately 20 facilities with a combined floor space of 234,443 square feet are being deactivated.

With respect to the programmatic alternatives, if a site other than Y-12 or Pantex is selected for a CNPC, Pantex and Y-12 could be closed. At Pantex, this would involve closing approximately 400 buildings totaling 1.8 million square feet. At Y-12, approximately 5.3 million square feet of floor space and approximately 390 facilities would be closed. For each of the programmatic action alternatives, moving plutonium storage to Zone 12 at Pantex would result in closing more than 74,200 square feet of storage facilities in Zone 4.

3.16.3 Impacts on Complex Facilities for Project-Specific Alternatives

With respect to potential cumulative impacts, project specific actions could also affect the total number of facilities and square footage devoted to NNSA weapons activities. This could result in additional facility closures or transfer of facilities from the NNSA to another user. For example, if flight testing were moved from TTR, approximately 195 buildings, covering approximately 180,000 square feet, could be closed or transferred to another user.[45] For the Hydrodynamic Testing Downsize-in-Place Alternative, 29 facilities at LANL, LLNL, and SNL/NM, with a combined floor space of 56,475 square feet could be closed or transferred. For alternatives that move HE R&D from LLNL Site 300, up to 17 acres of facilities, involving more than 35,000 square feet, could be closed or transferred. If NNSA were to ultimately close Site 300, up to 115 buildings with a floor space of approximately 340,000 square feet could be closed or transferred.

[45] This SPEIS does not identify future users or uses of facilities that may or may not be closed. Any such actions are premature and would be more appropriately addressed if and when facilities become excess.

3.16.4 Employment Under the Programmatic Alternatives

For employment, the No Action Alternative would have the least impacts with the workforce remaining at the current level of approximately 27,000 management and operating contractors at the major sites analyzed in this SPEIS.

For the DCE Alternative, a new CPC could be constructed at Los Alamos, NTS, Pantex, SRS, or Y-12. If constructed, approximately 850 construction jobs and an operational workforce of approximately 1,780 could be added to the Complex.

The CCE Alternative has the greatest potential for employment impacts. The construction of CCE facilities could require more than 4,000 construction jobs and an operational workforce of approximately 4,500 could be added to the selected site(s). If Pantex is not selected for CCE facilities, Pantex could be closed, resulting in a loss of approximately 1,650 jobs. If CCE facilities are not located at Y-12, Y-12 could be closed with a loss of approximately 6,500 jobs.

For the Capability Based Alternative, the reduced level of production would entail the loss of approximately 3,000 jobs (400 at Pantex, 15 at SRS, and 2,600 at Y-12).

3.16.5 Transportation Under the Programmatic Alternatives

For the No Action Alternative, there would be no impacts to the existing transportation requirements of the Complex. Pits would continue to be transported from LANL to Pantex, Canned subassemblies (CSAs) would continue to be transported from Y-12 to Pantex, tritium reservoirs would continue to be transported between SRS and Pantex, and other required parts and materials would be transported among various NNSA sites.

For the DCE Alternative, transportation related to pit production could increase if a CPC were located at a site other than Pantex. If the CPC were located at Pantex, no off-site transportation related to pit production would be required.

For the CCE Alternative, if facilities were located at sites other than Y-12 and Pantex, up to 60 metric tons of plutonium, mostly in pit form, presently being stored at Pantex would be transported to the CNPC, and 252 tons of HEU would be transported from Y-12 to the CNPC. For the CNPC option, annual transportation related to nuclear production would cease once the CNPC becomes operational. For the CNC option, there would be annual transportation related to pits and CSAs between the CPC, CUC, and A/D/HE Center.

For the Capability Based Alternative, transportation requirements would be the same as for the No Action Alternative, except that the number of CSAs that would need to be transported from Y-12 to Pantex, would be reduced by approximately 50 percent and tritium shipments could be reduced by approximately 50 percent.

3.16.6 Accidents and Malicious Acts in Programmatic Alternatives

For the No Action Alternative and the Capability-Based Alternative, accident risks and consequences would remain the same. For the DCE and CCE Alternatives, the construction of new facilities would, in general, tend to reduce the risks and consequences of accidents due to advances in building design features. In general, if missions were moved to locations with populations lower than the populations at the sites where those missions are currently conducted, potential consequences would likely decrease. For example, if a CNPC were located at NTS, potential consequences associated with the A/D/HE mission, the CUC mission, and the CPC mission would be reduced compared to the No Action Alternative because of the greater distance to the site boundary and the smaller population within the surrounding area.

NNSA has prepared a classified appendix to this SPEIS that evaluates the potential impacts of malevolent, terrorist, or intentional destructive acts. Substantive details of terrorist attack scenarios, security countermeasures, and potential impacts are not released to the public because disclosure of this information could be exploited by terrorists to plan attacks. Appendix B (Section B.12.3) discusses the methodology used to evaluate potential impacts associated with a terrorist threat and the methodology by which NNSA assesses the vulnerability of its sites to terrorist threats and then designs its response systems. As discussed in that section, NNSA's strategy for the mitigation of environmental impacts resulting from extreme events, including intentional destructive acts, has three distinct components: (1) prevent or deter successful attacks; (2) plan and provide timely and adequate response to emergency situations; and (3) progressive recovery through long-term response in the form of monitoring, remediation, and support for affected communities and their environment.

Depending on the intentional destructive acts, impacts would be similar to or exceed the impacts of accidents analyzed in the SPEIS. These analyses provide NNSA with information upon which to base, in part, decisions regarding transformation of the Complex. The classified appendix evaluates several scenarios involving intentional destructive acts for alternatives at the following sites (LANL, LLNL, NTS, SRS, Pantex, and Y-12) and calculates consequences to the noninvolved worker, maximally exposed individual, and population in terms of physical injuries, radiation doses, and LCFs. Although the results of the analyses cannot be disclosed, the following general conclusion can be drawn: the potential consequences of intentional destructive acts are highly dependent upon distance to the site boundary and size of the surrounding population -- the closer and higher the surrounding population, the higher the consequences. In addition, it is generally easier and more cost-effective to protect new facilities, as new security features can be incorporated into their design. In other words, protection forces needed to defend new facilities may be smaller due to the inherent security features of a new facility. New facilities can, as a result of design features, better prevent attacks and reduce the impacts of attacks. Impacts from intentional destructive acts would be much lower for the project-specific alternatives than for the programmatic alternatives due to the fact that the programmatic alternatives involve significant quantities of special nuclear materials.

3.16.7 Infrastructure Demands for the Programmatic Alternatives

Electricity. Under the No Action Alternative, all sites have an adequate existing electrical infrastructure to support current and planned activities.

LANL has adequate electricity to support all of the alternatives.

At NTS, the existing infrastructure would be adequate to support all construction requirements. However, to support operations for a CUC, CNC, or CNPC, NTS would need to procure additional power.

At Pantex, the existing infrastructure would be adequate to support all construction requirements. However, to support operations for a CUC or CNPC, Pantex would need to procure additional power.

At SRS and Y-12, the existing infrastructure would be adequate to support the construction and operation of all alternatives. Construction and operation would have a negligible impact on current site infrastructure.

Water. Under the No Action Alternative, all sites have an adequate existing water infrastructure to support current and planned activities.

LANL has adequate water rights to support a CPC, CUC, or A/D/HE Center. However, operation of multiple new facilities (CNPC) would exceed the current LANL water rights.

At NTS, the sustainable site capacity for water would be adequate to support the construction and operation of all alternatives.

At Pantex, the existing wellfield capacity would be adequate to support the construction and operation of all alternatives.

At SRS and Y-12, the existing water infrastructure would be adequate to support the construction and operation of all alternatives.

3.17 PREFERRED ALTERNATIVES

CEQ regulations require an agency to identify the alternative it prefers for achieving its purpose in a Final EIS (40 CFR 1502.14(e)). NNSA's preferred alternative is described below. It is based on NNSA's consideration of environmental impacts described in this Final SPEIS, as well as other factors such as mission and infrastructure compatibility, economic analyses, safety, safeguards and security, and workforce training and retention. **The preferred alternative described below reflects NNSA's current preference, but it is not a decision. NNSA will announce any decisions in one or more Records of Decision and may select an alternative other than the preferred alternative identified below.**

3.17.1 Preferred Alternatives for Restructuring SNM Facilities

- **Plutonium manufacturing and R&D:** Los Alamos would provide a consolidated plutonium research, development, and manufacturing capability within TA-55 enabled by construction and operation of the Chemistry and Metallurgy Research Replacement—Nuclear Facility (CMRR-NF). The CMRR-NF is needed to replace the existing Chemistry and Metallurgy Research (CMR) Facility (a 50-year old facility that has significant safety issues that cannot be addressed in the existing structure), to support movement of plutonium R&D and Category I/II quantities of SNM from LLNL, and consolidate weapons-related plutonium operations at Los Alamos. Until completion of a new Nuclear Posture Review in 2009 or later, the net production at Los Alamos would be limited to a maximum of 20 pits per year. Other national security actinide needs and missions would continue to be supported at TA-55 on a priority basis (e.g., emergency response, material disposition, nuclear energy).

- **Uranium manufacturing and R&D:** Y-12 would continue as the uranium center producing components and canned subassemblies, and conducting surveillance and dismantlement. NNSA has completed construction of the HEUMF and will consolidate HEU storage in that facility.[46] NNSA would build a Uranium Processing Facility (UPF) at Y-12 in order to provide a smaller and modern highly-enriched uranium production capability to replace existing 50-year old facilities. The site-specific impacts and candidate locations for a UPF will be analyzed in a new SWEIS for Y-12 that NNSA is currently preparing.

- **Assembly/disassembly/high explosives production and manufacturing:** Pantex would remain the Assembly/Disassembly/High Explosives production and manufacturing center. NNSA would consolidate non-destructive surveillance operations at Pantex.

- **Consolidation of Category I/II SNM:** NNSA would continue to transfer Category I/II SNM from LLNL under the No Action Alternative and phase out Category I/II operations at LLNL Superblock by the end of 2012. NNSA would consolidate Category I/II SNM at Pantex within Zone 12, and close Zone 4.

[46] The environmental impacts at HEUMF and its alternatives are analyzed in the 2001 Y-12 SWEIS (DOE 2001a).

3.17.2 Preferred Alternatives for Restructuring R&D and Testing Facilities

HE R&D. NNSA would reduce the footprint of its HE production and R&D related to nuclear weapons; and reduce the number of firing sites. Use of energetic materials (greater than 1 kg) for environmental testing conducted at SNL/NM would continue (e.g., acceleration or sled tracks, shock loading, or in explosive tubes) and is not included in HE R&D. NNSA would consolidate weapons HE R&D and testing within the following locations, without constraining transfer and operation of weapons programs firing sites to other NNSA, DoD, and national security sponsors, as follows

- Pantex would remain the HE production (formulation, processing, and testing) and machining center. All HE production and machining to develop nuclear explosive packages would continue at Pantex. HE experiments up to 22 kg HE would remain at Pantex;
- NTS would remain the testing center for large quantities of HE (greater than 10 kg);
- LLNL would be the HE R&D center for formulation, processing, and testing (processing capability to handle up to 15 kg and testing less than 10 kg) HE at the High Explosives Applications Facility (HEAF); formulation and processing of HE would be conducted either at a new HEAF Annex built adjacent to HEAF, or at existing Site 300 facilities (but using less space than currently used for these activities);
- SNL/NM would remain the HE R&D center for non-nuclear explosive package components (less than 1 kg of HE) at the Explosive Components Facility (ECF); and
- LANL would produce war reserve main charge detonators, conduct HE R&D experimentation and support activities, and move towards contained HE R&D experimentation.
- Each site would maintain one weapons program open-burn and one open-detonation area for safety and treatment purposes.

Tritium R&D. NNSA would consolidate tritium R&D at SRS. SRS would remain the site for tritium supply management and provide R&D support to production operations and gas transfer system development. Neutron generator target loading at SNL/NM and production of National Ignition Facility targets at LLNL, which involve small quantities of tritium, would continue and would not be included in this consolidation. NNSA would move bulk quantities of tritium from LANL to SRS by 2009; and remove tritium materials above the 30 gram level from the Weapons Engineering Tritium Facility (WETF) at LANL by 2014.

NNSA flight test operations. Campaign Mode Operation of Tonopah Test Range (TTR) (Option 3—Campaign under Reduced Footprint Permit). NNSA would reduce the footprint of TTR, upgrade equipment with mobile capability, and operate in campaign mode. NNSA expects it would not use Category I/II SNM in future flight tests.

Major Hydrodynamic Testing. By the end of fiscal year 2008, NNSA would contain the hydrodynamic testing (consisting of Integrated Weapons Experiments and Focused Experiments) at LLNL at the Contained Firing Facility (CFF) and at LANL at the Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility. At LANL, firing site operations for weapon programs required by NNSA's hydrodynamic test program would be moved to contained firing. In addition:

- Hydrotesting at LLNL Site 300 would be consolidated to a smaller footprint by 2015.
- The goal is to minimize open-air testing at LANL. Open-air hydrotests at LANL's DARHT, excluding SNM, would only occur if needed to meet national security requirements.
- NNSA would allow open-air firing at LANL TA-36 until adequate radiographic capabilities and associated supporting infrastructure are available for open-air firing at NTS.

Major Environmental Test Facilities. NNSA would consolidate major environmental testing at SNL/NM and, infrequently conduct operations requiring Category I/II SNM in security campaign mode there. NNSA would close LANL's and LLNL's major environmental testing facilities by 2010 (except those in LLNL Building 334 and the Building 834 Complex). NNSA would move environmental testing of nuclear explosive packages and other functions currently performed in LLNL Buildings 334 and 834 to Pantex by 2012.

Sandia National Laboratories, California Weapons Support Functions. NNSA would continue operations under the No Action Alternative.

As to any other programmatic and project-specific alternatives not mentioned above, NNSA's preferred alternative at this time is to continue with the No Action Alternatives. Section 5.20 of this Final SPEIS provides a summary of the environmental impacts of the preferred alternatives.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
Land Use							
LANL	Current and planned activities would continue as required to accomplish assigned missions. LANL has approximately 2,000 structures with approximately 8.6 million square feet under roof, spread over an area of approximately 25,600 acres.	*Greenfield CPC*: Potential disturbance of 140 acres for construction and 110 acres for operation. *Upgrade*: Potential disturbance of 13 acres for construction and 6.5 acres for operation. *50/80*: Potential disturbance of 6.5 acres for construction and 2.5 acres for operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be less than 1% of LANL total land area.	Potential disturbance of 50 acres for construction and 35 acres for operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be less than 1% of LANL total land area	Potential disturbance of 300 acres from construction and 300 acres from operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be approximately 1.2% of LANL total land area.	195 acres (includes 50 acre buffer area) needed to operate CNC. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be approximately 1% of LANL total land area.	545 acres (includes 100-acre buffer area) needed to operate CNPC. Land uses would remain compatible with surrounding areas and with land use plans. Two non-contiguous TAs would be used for the CNPC. Land required would be approximately 2.3% of LANL total land area. Y-12 and Pantex would close, reducing the size of the Complex by 16,777 acres.	Potential disturbance of 6.5 acres. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be less than 1% of LANL total land area.
NTS	Current and planned activities would continue as required to accomplish assigned missions. Approximately 45 percent of NTS is currently unused or provides buffer zones for ongoing programs or projects, while about 7-10 percent (60,000 – 86,500 acres) of the site has been disturbed.	Potential disturbance of 140 acres for construction and 110 acres for operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be less than 1% of NTS total land area.	Potential disturbance of 50 acres for construction and 35 acres for operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be less than 1% of NTS total land area.	Because NTS would use existing capabilities at the DAF, potential land disturbance for construction and operation would be approximately 200 acres. Land required would be less than 1% of NTS total land area.	195 acres (includes 50-acre buffer area) needed to operate CNC. Land uses would remain compatible with surrounding areas and with land use plans.	445 acres (includes 100-acre buffer area) needed to operate CNPC. Land uses would remain compatible with surrounding areas and with land use plans. Y-12 and Pantex would close, reducing the size of the Complex by 16,777 acres.	NTS would be unaffected by the Capability Based Alternative.
Pantex	Preferred Alternative**:** Current and planned activities would continue on the 15,977- acre site as required to accomplish assigned missions. No new land disturbance expected.	Potential disturbance of 140 acres for construction and 110 acres for operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be less than 1% of Pantex total land area.	Potential disturbance of 50 acres for construction and 35 acres for operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be less than 1% of Pantex total land area.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	545 acres (includes 100-acre buffer area) needed to operate CNPC. Land uses would remain compatible with surrounding areas and with land use plans. Y-12 would close, reducing the size of the Complex by approximately 800 acres.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
SRS	Current and planned activities would continue on the 198,420-acre site as required to accomplish assigned missions. Approximately 77 acres of additional land would be disturbed by construction of the Mixed-Oxide (MOX) Fuel Fabrication Facility which broke ground August 2007 and the Pit Disassembly and Conversion Facility (PDCF) scheduled to break ground in 2010.	Potential disturbance of 140 acres for construction and 110 acres for operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be less than 1% of SRS total land area.	Potential disturbance of 50 acres for construction and 35 acres for operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be less than 1% of SRS total land area.	Potential disturbance of 300 acres from construction and 300 acres from operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be less than 1% of SRS total land area	195 acres (includes 50 acre buffer area) needed to operate CNC. Land uses would remain compatible with surrounding areas and with land use plans.	545 acres (includes 100 acre buffer area) needed to operate CNPC. Land uses would remain compatible with surrounding areas and with land use plans. Y-12 and Pantex would close, reducing the size of the Complex by 16,777 acres.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Y-12	Current and planned activities would continue on the 800-acre site located on the 35,000-acre Oak Ridge Reservation as required to accomplish assigned missions.	Potential disturbance of 140 acres for construction and 110 acres for operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be approximately 17.5% of Y-12 total land area	Preferred Alternative**:** UPF could disturb approximately 35 acres for construction and 8 acres for operation at Y-12. Land uses would remain compatible with surrounding areas and with land use plans. UPF would enable protected area to be reduced by 90%.	Potential disturbance of 300 acres for construction and 300 acres for operation. Land uses would remain compatible with surrounding areas and with land use plans. Land required would be approximately 37.5% of Y-12 total land area.	Y-12 performs the CUC mission; therefore the impact of a CNC at this site is identical to the CPC impact.	518 acres (includes 100 acre buffer area) needed to operate CNPC. Land uses would remain compatible with surrounding areas and with land use plans. Pantex would close, reducing the size of the Complex by 15,977 acres.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
	Visual Resources						
LANL	Current and planned activities would continue as required resulting in no additional impacts.	Short-term, temporary visual impacts from construction. New facilities would be visible from higher elevations beyond LANL boundary; however, change would be consistent with currently developed areas. No change to VRM Classification.	Short-term, temporary visual impacts from construction. New facilities would be visible from higher elevations beyond LANL boundary; however, change would be consistent with currently developed areas. No change to VRM Classification.	Short-term, temporary visual impacts from construction. New facilities would be visible from higher elevations beyond LANL boundary; however, change would be consistent with currently developed areas. No change to VRM Classification.	New facilities would be visible from higher elevations beyond LANL boundary; however, change would be consistent with currently developed areas. No change to VRM Classification.	Short-term, temporary visual impacts from construction. New facilities would be visible from higher elevations beyond LANL boundary; however, change would be consistent with currently developed areas. No change to VRM Classification.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
NTS	Current and planned activities would continue as required resulting in no additional impacts.	Short-term, temporary visual impacts from construction. New facilities would not be visible outside of NTS boundary. No change to VRM Classification.	Construction activities would create short-term, temporary visual impacts. No change to VRM Classification.	Short-term, temporary visual impacts from construction. New facilities would not be visible outside of NTS boundary. No change to VRM Classification.	New facilities would not be visible outside of NTS boundary; change would be consistent with currently developed areas. No change to VRM Classification.	Short-term, temporary visual impacts from construction. New facilities would not be visible outside of NTS boundary. No change to VRM Classification.	NTS would be unaffected by the Capability Based Alternative.
Pantex	Current and planned activities	Short-term, temporary visual	Construction activities	No A/D/HE Center is	Pantex performs the	New facilities would be	Planned activities

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
	would continue as required resulting in no additional impacts.	impacts from construction. The reference location is obstructed from off-site view. Changes to visual appearance would be consistent with currently developed areas. No change to VRM Classification.	would create short-term, temporary visual impacts. The reference location is obstructed from off-site view. Changes to visual appearance would be consistent with currently developed areas. No change to VRM Classification.	proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	obstructed from off-site view. Change would be consistent with currently developed areas. No change to VRM Classification.	would continue as required to support smaller stockpile requirements resulting in no additional impacts.
SRS	Current and planned activities would continue with short-term impacts to visual resources resulting from construction of the MOX/PDCF facilities in the F-Area. Changes would be consistent with existing structures of the area and no change to VRM classification would be required.	Short-term, temporary visual impacts from construction. The reference location is obstructed from off-site view. Changes to visual appearance would be consistent with currently developed areas. No change to VRM Classification.	Construction activities would create short-term, temporary visual impacts. The reference location is obstructed from off-site view. Changes to visual appearance would be consistent with currently developed areas. No change to VRM Classification.	Short-term, temporary visual impacts from construction. The reference location is obstructed from off-site view. Changes to visual appearance would be consistent with currently developed areas. No change to VRM Classification.	New facilities would be obstructed from off-site view. Change would be consistent with currently developed areas. No change to VRM Classification.	Short-term, temporary visual impacts from construction. The reference location is obstructed from off-site view. Changes to visual appearance would be consistent with currently developed areas. No change to VRM Classification.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Y-12	Current and planned activities would continue as required resulting in no additional impacts.	Short-term, temporary visual impacts from construction. Changes to visual appearance would be consistent with currently developed areas. No change to VRM Classification.	Changes to visual appearance would be consistent with currently developed areas. No change to VRM Classification.	Short-term, temporary visual impacts from construction. Changes to visual appearance would be consistent with currently developed areas. No change to VRM Classification.	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC impact.	Short-term, temporary visual impacts from construction. Changes to visual appearance would be consistent with currently developed areas. No change to VRM Classification.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Site Infrastructure							
LANL	Current and planned activities would continue as required resulting in no additional impacts. The current power pool peak power capacity is 150 megawatts-electric [MWe]). The available site capacity is 63 MWe.	Under all approaches, existing infrastructure would be adequate to support construction and operation requirements. Operation of a CPC would have the potential to use approximately 17.5% of the peak power capacity that is available.	Existing infrastructure would be adequate to support construction and operation requirements. Operation of a CUC would have the potential to use approximately 29.2% of the peak power capacity that is available.	Operation of A/D/HE Center would have the potential to use approximately 18.9% of the peak power capacity that is available.	Operation of a CNC would have the potential to use approximately 45.1% of the peak power capacity that is available.	Operation of a CNPC would have the potential to use approximately 65.6% of the peak power capacity that is available.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
NTS	Current and planned activities would continue as required resulting in no additional impacts. NTS would be expected to continue using	Existing infrastructure would be adequate to support construction and operation requirements. Power requirements would be 64%	Existing infrastructure would be adequate to support construct requirements. Power requirements would be	Existing infrastructure would be adequate to support construction. . Power requirements would be 69% of	Power requirements would be 288% of available site electrical energy capacity. For operations, NTS would need to procure additional	Power requirements would be 357% of available site electrical energy capacity. For operations, NTS would need to procure additional	NTS would be unaffected by the Capability Based Alternative.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
	101,377 MWh of electricity per year. Electrical usage is below current site capacity.	of available site electrical energy capacity.	224% of available site electrical energy capacity. For operations, NTS would need to procure additional power.	available site electrical energy capacity.	power.	power.	
Pantex	Current and planned activities would continue as required resulting in no additional impacts to site infrastructure. Pantex would be expected to continue using about 81,850 MWh of electricity per year.	Existing infrastructure would be adequate to support construction and operation requirements. Power requirements would be 40% of available site electrical capacity.	Existing infrastructure would be adequate to support construction requirements. During operations, power requirements would be 140% of available site electrical energy capacity. To support a CUC, Pantex would have to procure additional power.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	During operations, power requirements would be 148% of available site electrical energy capacity. To support a CNPC, Pantex would have to procure additional power.	Planned activities would continue as required to support smaller stockpile requirements. Infrastructure needs would be reduced.
SRS	Current and planned activities would continue, with the increased electrical usage from the MOX/PDCF facilities for a electrical use of 405,000 MWh/yr (370,000 MWh/yr existing plus 35,000 MWh/yr for the MOX/PDCF facilities)	Existing infrastructure would be adequate to support construction and operation requirements. Construction and operation requirements would have a negligible impact on current site infrastructure.	Existing infrastructure would be adequate to support construction requirements. Construction and operation requirements would have a negligible impact on current site infrastructure.	Existing infrastructure would be adequate to support construction requirements. Construction and operation requirements would have a negligible impact on current site infrastructure.	Existing infrastructure would be adequate to support operation requirements. Operation would require 15% of available electrical site capacity. Operation requirements would have a negligible impact on current site infrastructure.	Existing infrastructure would be adequate to support construction requirements. Operation requirements would have a negligible impact on current site infrastructure.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Y-12	Current and planned activities would continue as required resulting in no additional impacts to site infrastructure. Y-12 would be expected to continue using about 350,000 MWh of electricity per year.	Existing infrastructure would be adequate to support construction and operation requirements. During operations, power requirements would be <1% of available site electrical capacity.	Existing infrastructure would be adequate to support construction and operation requirements. During operations, power requirements would be <1% of available site electrical capacity.	Existing infrastructure would be adequate to support construction requirements. During operations, power requirements would be 1.5% of available site electrical capacity.	By definition, there is no CNC at Y-12.	Existing infrastructure would be adequate to support operation requirements. During operations, power requirements would be 7.1% of available site electrical capacity.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
	Air Quality						
LANL	Current and planned activities would continue as required resulting in no additional impacts. The area encompassing LANL and Los Alamos County is classified as an attainment area for all six criteria pollutants. Simultaneous operation of LANL's air emission sources	Construction activities would create temporary increase in air quality impacts, but would not result in violations of the National Ambient Air Quality Standards (NAAQS). Operations would result in incremental increases less than 5% of baseline for most	Construction activities would create temporary increased in air quality impacts similar to CPC. For operations, CUC contribution to nonradiological emissions would not cause any standard or guideline to be exceeded.	Construction activities would create temporary increase in air quality impacts that could result in exceeding PM_{10} regulatory limits. Operations could have the potential to exceed the 24-hour standard for nitrogen	Operations would result in incremental increases less than 5% of baseline for most pollutants. The greatest increase would occur for total suspended particulates (TSP), which could increase by approximately 28%.	Operations could have the potential to exceed the 24-hour standard for nitrogen dioxide and the 24-hour standard for TSP.	The higher level of pit production would result in the annual emission of an additional 0.000019 curies per year of plutonium from the Plutonium Facility Complex.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
	at maximum capacity, as described in the Title V permit application, would not exceed any state or Federal ambient air quality standards.	pollutants. The greatest increase would occur for total suspended particulates (TSP), which could increase by approximately 28%.		dioxide and the 24-hour standard for TSP.			
NTS	Current and planned activities would continue as required resulting in no additional impacts. No emission limits for any criteria air pollutants or HAPS have been exceeded. Measured concentration of nonradiological criteria pollutants are below regulatory requirements. The estimated annual dose to the public from radiological emissions from current and past NTS activities is well below the 10 millirem per year dose limit.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	NTS would be unaffected by the Capability Based Alternative.
Pantex	Current and planned activities would continue as required resulting in no additional impacts. Pantex is in compliance with all National Ambient Air Quality standards.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
SRS	Emissions from current and planned MOX/PDCF facilities would result in no additional impacts. SRS is in compliance with all National Ambient Air Quality standards.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	Negligible impacts to air quality for construction and operation. No NAAQS exceeded.	Negligible impacts to air quality for operations. No NAAQS exceeded.	Negligible impacts to air quality for operations. No NAAQS exceeded.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Y-12	Current and planned activities would continue, resulting in no additional impacts. Y-12 is designated non-attainment area for 8-hour ozone and is in compliance with all other National Ambient Air Quality standards.	Temporary increases in pollutant emissions due to construction activities are too small to result in violations of the NAAQS beyond the Y-12 site boundary, with the exception of PM-2.5 and PM-10 concentrations (which could be mitigated using dust suppression), and the 8-hour	Temporary increases in pollutant emissions due to construction activities are too small to result in violations of the NAAQS beyond the Y-12 site boundary, with the exception of PM-2.5 and PM-10 concentrations (which could be mitigated	Temporary increases in pollutant emissions due to construction activities are too small to result in violations of the NAAQS beyond the Y-12 site boundary, with the exception of PM-2.5 and PM-10 concentrations (which could be mitigated	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC plus UPF impact.	Potential to exceed PM-10 and ozone levels due to high background levels.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
		ozone concentration. The 8-hour ozone concentration exceedance is not a result of Y-12-specific activities. No new hazardous air emissions would result from the facility operation. Additionally, 90 percent of emissions at Y-12 are from operation of the steam plant, which would be relatively unaffected by CPC operations.	using dust suppression), and the 8-hour ozone concentration. The 8-hour ozone concentration exceedance is not a result of Y-12-specific activities. No new hazardous air emissions would result from the facility operation. Additionally, 90 percent of emissions at Y-12 are from operation of the steam plant, which would be relatively unaffected by UPF operations.	using dust suppression), and the 8-hour ozone concentration. The 8-hour ozone concentration exceedance is not a result of Y-12-specific activities. No new hazardous air emissions would result from the facility operation. Additionally, 90 percent of emissions at Y-12 are from operation of the steam plant, which would be relatively unaffected by A/D/HE Center operations.			
	Noise						
LANL	Current and planned activities would continue as required resulting in no additional impacts.	Construction activities and additional traffic would generate temporary increases in noise, but would not extend far beyond the boundaries of the construction site. Noise from operations similar to existing operations.	Same as CPC.	Same as CPC.	Same as CPC.	Same as CPC.	Same as No Action Alternative.
NTS	Current and planned activities would continue as required resulting in no additional impacts.	Construction activities and additional traffic would generate temporary increases in noise, but would not extend far beyond the boundaries of the construction site. Noise from operations similar to existing operations.	Same as CPC.	Same as CPC.	Same as CPC.	Same as CPC.	NTS would be unaffected by the Capability Based Alternative.
Pantex	Current and planned activities would continue as required resulting in no additional impacts.	Construction activities and additional traffic would generate temporary increases in noise, but would not extend far beyond the boundaries of the construction site. Noise from operations similar to existing operations.	Same as CPC.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	Same as CPC.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
SRS	Construction of the MOX/PDCF facilities and additional traffic supporting this construction would	Construction activities and additional traffic would generate temporary increases in noise, but would not extend	Same as CPC.	Same as CPC.	Same as CPC.	Same as CPC.	Planned activities would continue as required to support smaller stockpile

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
	temporarily generate additional noise impacts. Construction noise not expected off-site.	far beyond the boundaries of the construction site. Noise from operations similar to existing operations.					requirements resulting in no additional impacts.
Y-12	Current and planned activities would continue, with traffic as the primary contributor to noise to the surrounding population, and no additional impacts expected.	Construction activities and additional traffic would generate temporary increases in noise, but would not extend far beyond the boundaries of the construction site. Noise from operations similar to existing operations.	Same as CPC.	Same as CPC.	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC impact.	Same as CPC.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Water Resources							
LANL	Current and planned activities would continue as required resulting in no additional impacts. Approximately 380 million gallons of groundwater are used at LANL. Discharges were in compliance with discharge permits.	For construction and operation of the Greenfield CPC, annual groundwater use would increase by approximately 21%. However, LANL water use would remain within water rights.	For construction and operation, the increase in groundwater consumption would be approximately 27.6%. LANL water use would remain within water rights.	For construction and operation, annual groundwater use would increase by approximately 34.2%. LANL water use would be within water rights.	Annual groundwater use would increase by approximately 48.6%. LANL groundwater use would exceed water rights by approximately 23 million gallons/year.	Annual groundwater use would increase by approximately 104%. LANL groundwater use would exceed water rights by approximately 233 million gallons/year.	Same a No Action Alternative.
NTS	Current and planned activities would continue with an expected demand for groundwater of 634 million gallons per year. The annual maximum production capacity of site potable supply wells is approximately 2.1 billion gallons per year while the sustainable site capacity is estimated to be approximately 1.36 billion gallons per year	For construction and operation, annual groundwater use would require approximately 7% of sustainable site water capacity. No impact on groundwater availability or quality is anticipated.	For construction and operation, annual groundwater use would require less than 8% of sustainable water capacity. No impact on groundwater availability or quality is anticipated.	For construction and operation, annual groundwater use would require approximately 10% of sustainable water capacity. No impact on groundwater availability or quality is anticipated.	Operation of the CNC would use approximately 14.2% of the sustainable site water capacity. No impact on groundwater availability or quality is anticipated.	Operation of the CNPC would use approximately 23.7% of the sustainable site water capacity. No impact on groundwater availability or quality is anticipated.	NTS would be unaffected by the Capability Based Alternative.
Pantex	Current and planned activities would continue as required with an expected demand for water of 130,000 million gallons per year. Pantex obtains its water from the City of Amarillo, which obtains water from the	For construction and operation, annual groundwater use would increase by 68% compared to existing use. No impact on groundwater availability or quality is anticipated from construction activities.	For construction and operation, annual groundwater use would increase by approximately 81% compared to existing use. No impact on groundwater availability or quality is anticipated from	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	CNPC operations would increase groundwater use by approximately 150% compared to existing use. CNPC would require total of approximately 315.5 million gallons/year. The Pantex wellfield has a	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
	Ogallala aquifer.	Pantex's total contribution to the depletion of the Ogallala Aquifer from operation of the CPC would be approximately 0.0003 percent of the estimated annual total depletion.	construction activities. Pantex's total contribution to the depletion of the Ogallala Aquifer from operation of the CUC would be approximately 0.0004 percent of the estimated annual total depletion.			water capacity of approximately 422.7 million gallons/ year. Pantex's total contribution to the depletion of the Ogallala Aquifer from operation of the CNPC would be less than 1 percent of the estimated annual total depletion.	
SRS	Current and planned activities would continue as required with an expected demand for water (groundwater and surface water) of 3.5 billion gallons/yr plus a small increase for the operation of the MOX/PDCF facilities.	For construction and operation, annual water use would increase by approximately 2% compared to existing use.	For construction and operation, annual water use by 3% compared to existing use.	For construction and operation, annual water use would increase by approximately 4% compared to existing use.	Operation of CNC would increase water use by approximately 5% compared to existing use.	Operation of CNPC would increase water use by 9% compared to existing use.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Y-12	Current and planned activities would continue as required with an expected demand for water of approximately 2,000 million gallons per year.	For construction and operation, annual water use would increase by approximately 4% compared to existing use.	For construction and operation, annual water use would increase by approximately 5% compared to existing use.	For construction and operation, annual water use would increase by approximately 7% compared to existing use.	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC impact.	Operation of CNPC would increase water use by approximately 20% compared to existing use.	Planned activities would continue as required to support smaller stockpile requirements.
	Geology and Soils						
LANL	Current and planned activities would continue as required resulting in no additional impacts.	Under all approaches impacts would be minor. Appropriate mitigation measures would minimize soil erosion and impacts. All facilities would be designed and constructed in accordance with DOE Order 420.1.	Same as CPC.	Same as CPC.	Same as CPC.	Same as CPC.	Same a No Action Alternative.
NTS	Current and planned activities would continue as required resulting in no additional impacts.	Impacts would be minor. Appropriate mitigation measures would minimize soil erosion and impacts.	Same as CPC.	Same as CPC.	Same as CPC.	Same as CPC.	NTS would be unaffected by the Capability Based Alternative.
Pantex	Current and planned activities would continue as required with no expected impacts on the Pullman and Randall soil series, or other geological and soil resources.	Impacts would be minor. Appropriate mitigation measures would minimize soil erosion and impacts.	Same as CPC.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	Same as CPC.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
SRS	Construction of the MOX/PDCF facilities would have minor impacts to the Coastal Plain sediments and other soil resources, but would be small and mitigated by erosion and runoff controls.	Impacts would be minor. Appropriate mitigation measures would minimize soil erosion and impacts.	Same as CPC.	Same as CPC.	Same as CPC.	Same as CPC.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Y-12	Current and planned activities would continue as required with no expected impacts to soils in an area highly prone to erosion.	Impacts would be minor. There is a moderate seismic risk at Y-12, but this should not impact the construction and operation of the CPC and UPF. Appropriate mitigation measures would minimize soil erosion and impacts.	Same as CPC.	Same as CPC.	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC impact.	Same as CPC.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Biological Resources							
LANL	Current and planned activities would continue as required resulting in no additional impacts.	TA-55 contains core and buffer areas of environmental interest for the Mexican Spotted Owl. Potential impacts would be within previously and substantially developed areas.	TA-55 contains core and buffer areas of environmental interest for the Mexican Spotted Owl. Potential impacts would be within previously and substantially developed areas.	Potential impacts at TA-16 would be within previously and substantially developed areas.	Potential impacts would be within previously and substantially developed areas.	Same as CNC.	Same a No Action Alternative.
NTS	Current and planned activities would continue as required resulting in no additional impacts.	Construction would not impact biological resources because new facilities would be sited on previously disturbed land. Operations would not impact biological resources because activities would be located in previously disturbed or heavily industrialized portions that do not contain habitat sufficient to support biologically diverse species mix.	Construction would not impact biological resources because new facilities would be sited on previously disturbed land.	Same as CUC.	Reference location is in highly developed area, impacts would be minimal.	Same as CNC.	NTS would be unaffected by the Capability Based Alternative.
Pantex	Current and planned activities would continue as required resulting in no additional impacts.	Construction would not impact biological resources because new facilities would be sited on previously disturbed land.	Construction would not impact biological resources because new facilities would be sited on previously disturbed land.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC	Reference location is in highly developed area, impacts would be minimal.	Planned activities would continue as required to support smaller stockpile requirements

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
		Operations would not impact biological resources because activities would be located in previously disturbed or heavily industrialized portions that do not contain habitat sufficient to support biologically diverse species mix.			Operation in next column.		resulting in no additional impacts.
SRS	Some animals and birds could be temporarily displaced by construction of the MAX/PDCF facilities, but this would be small due to the areas existing partial development.	Construction would not impact biological resources because new facilities would be sited on previously disturbed land. Operations would not impact biological resources because activities would be located in previously disturbed or heavily industrialized portions that do not contain habitat sufficient to support biologically diverse species mix.	Construction would not impact biological resources because new facilities would be sited on previously disturbed land.	Same as CUC.	Operations would not impact biological resources because activities would be located in previously disturbed or heavily industrialized portions that do not contain habitat sufficient to support biological diverse species mix.	Same as CNC.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Y-12	Current and planned activities would continue as required resulting in no additional impacts.	Short-term impacts could occur during construction activities. Facilities would be sited on previously disturbed land. Operations would not impact biological resources because activities would be located in previously disturbed or heavily industrialized portions that do not contain habitat sufficient to support biologically diverse species mix.	Same as CPC.	Short-term impacts could occur during construction activities. Facilities would be sited on previously disturbed land.	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC impact.	Reference location is in highly developed and previously disturbed area, therefore there would be no impacts to biological resources.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
	Cultural Resources						
LANL	Current and planned activities would continue as required resulting in no additional impacts.	Under all approaches there is a potential for resources to be disturbed. The number of resources impacted would increase as the number of acres disturbed increases.	Under all approaches there is a potential for resources to be disturbed. The number of resources impacted would increase as the number of acres	Same as CUC.	No impacts are anticipated from operation activities.	Same as CNC.	Same a No Action Alternative.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
			disturbed increases.				
NTS	Current and planned activities would continue as required resulting in no additional impacts.	There is a low probability of impacts to cultural resources to occur.	There is a low probability of impacts to cultural resources to occur.	Same as CUC.	No impacts to cultural resources are anticipated from operation activities.	Same as CNC.	NTS would be unaffected by the Capability Based Alternative.
Pantex	Current and planned activities would continue with no expected impacts on the 69 identified archeological sites located on the Pantex site.	No cultural resources would be impacted. Probabilities for impacts at other areas on the site would depend on the locations since some area on the site can exhibit a higher density of cultural resources. There would be no impacts from operation activities.	No cultural resources would be impacted. Probabilities for impacts at other areas on the site would depend on the locations since some area on the site can exhibit a higher density of cultural resources.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	There would be no impacts from operation activities.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
SRS	Construction of the MOX/PDCF facilities is not expected to impact any of the approximately 800 recorded archeological and culturally significant sites at SRS. Prior to any soil disturbance a registry search and on-site inspection would take place.	The reference location is located in an Archaeological Zone 2 (area with moderate archaeological potential) and close to a Zone 1 (high archaeological potential) area. Therefore there is a high probability that resources are located w/in the reference location and would be impacted by construction activities. There would be no additional impacts from operation activities.	The reference location is located in an Archaeological Zone 2 (area with moderate archaeological potential) and close to a Zone 1 (high archaeological potential) area. Therefore there is a high probability that resources are located w/in the reference location and would be impacted by construction activities.	Same as CUC.	There would be no impacts to cultural and archaeological resources from operation activities.	Same as CNC.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Y-12	Current and planned activities would continue with no impacts to an area rich in historical and cultural resources and no identified Native American resources.	Construction of the CPC and UPF would be compatible and consistent with the current status of cultural resources and activities would take place in areas outside of the proposed historic district. There would be no impacts as a result of operational activities.	Same as CPC.	Construction of the CPC and UPF would be compatible and consistent with the current status of cultural resources and activities would take place in areas outside of the proposed historic district.	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC impact.	There would be no impacts as a result of operational activities.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Socioeconomic Resources							
LANL	Current and planned activities would continue as required resulting in no additional impacts. Employment at LANL is expected to continue	*Greenfield CPC:* 770 workers during the peak year of construction. Total of 2,650 jobs. 1,780 operational workers, total of 3,667 jobs	1,300 workers during the peak year of construction. Total of 2,678 jobs. No appreciable changes to regional socioeconomic	3,820 jobs during peak year of construction. Total 7,869 jobs. No appreciable changes to regional socioeconomic	2,715 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	4,500 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	Employment at LANL is expected to continue to rise due to increased pit production.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
	to rise due to both increased pit production and increased remediation and D&D activities. If LANL's employment rate were to continue increasing at the same level experienced from 1996 through 2005 (2.2 percent annually), approximately 15,400 individuals could be employed at LANL by the end of 2011.	*Upgrade 125:* 300 workers during peak year of construction. Total of 618 jobs. 1,780 operational workers, total of 3,667 jobs. *50/80:* 190 workers during peak year of construction. Total of 391 jobs 680 operational workers, total of 1,401 jobs. Under all approaches there would be no appreciable changes to regional socioeconomic characteristics expected.	characteristics expected.	characteristics expected.		Pantex and Y-12 could be closed, resulting in a loss of approximately 8,150 jobs.	
LANL Plutonium Phaseout: If LANL is not selected as the site for the CPC or CNPC, NNSA proposes to phase-out NNSA plutonium operations and remove Category I/II SNM from LANL by approximately 2022. Phasing out the plutonium operations from TA-55 would result in a loss of approximately 610 jobs representing a decrease of 4.5 % of the workforce. The total loss of jobs in the economic area would be 1,260.							
NTS	Current level of NTS employment is expected to continue. Current and planned activities would continue as required resulting in no additional impacts.	850 workers during the peak year of construction. Total of 1,676 jobs. 1,780 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	1,300 workers during the peak year of construction. Total of 2,563 jobs. 935 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	525 jobs during peak year of construction. Total 1,560 jobs. 1,285 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	2,715 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	4,500 operational workers. No appreciable changes to regional socioeconomic characteristics expected. Pantex and Y-12 could be closed, resulting in a loss of approximately 8,150 jobs.	NTS would be unaffected by the Capability Based Alternative.
Pantex	Pantex is expected to continue present operations with an employment level of about 3,800 employees.	850 workers during the peak year of construction. Total of 1,527 jobs. 1,780 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	1,300 workers during the peak year of construction. Total of 2,336 jobs. 935 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	2,715 operational workers. Total of 5,319 jobs. No appreciable changes to regional socioeconomic characteristics expected. Y-12 could be closed, resulting in a loss of approximately 6,500 jobs.	Reduced operations would reduce the workforce from 1,644 to 1,230. This workforce, which currently represents approximately 1.3% of area employment, would fall to 1.2%. No major impact would occur.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
SRS	The current level of employment at SRS is about 15,000, which is expected to be increased by the construction of the MOX/PDCF facilities which would add an additional 1,968 construction workers and once operational an additional 1,120 employees.	850 workers during the peak year of construction. Total of 1,461 jobs. 1,780 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	1,300 workers during the peak year of construction. Total of 2,234 jobs. 935 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	3,820 workers during the peak year of construction. Total of 6,561 jobs. 1,785 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	2,715 operational workers. No appreciable changes to regional socioeconomic characteristics expected	4,165 operational workers. No appreciable changes to regional socioeconomic characteristics expected. Pantex and Y-12 could be closed, resulting in a loss of approximately 8,150 jobs.	Reduced operations would reduce the workforce by approximately 25 workers. This reduction would be inconsequential relative to the total site workforce.
Y-12	Y-12 is expected to continue present operations with an employment level of about 6,500 employees.	850 workers during the peak year of CPC construction. During operations, CPC would employ 1,780. No appreciable changes to regional socioeconomic characteristics expected.	Construction of UPF would require approximately 900 workers during the peak year of construction During operations, UPF would employ 600. No appreciable changes to regional socioeconomic characteristics expected.	3,820 workers during the peak year of construction. Total of 19,864 jobs. 1,285 operational workers. No appreciable changes to regional socioeconomic characteristics expected.	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC impact.	4,500 operational workers. No appreciable changes to regional socioeconomic characteristics expected. Pantex could be closed, resulting in a loss of approximately 1,650 jobs.	Reduced operations would reduce the workforce from 6,500 to 3,900 workers. The loss of 2,600 direct jobs could result in the loss of up to 10,920 indirect jobs for a total of 13,520 jobs lost. This would represent 6.5 percent of the total ROI employment.
Environmental Justice							
LANL	Current and planned activities would continue as required resulting in no additional impacts.	Minority population: 57 percent within the census tracts containing LANL Low-Income population: 9.3 percent of ROI Construction or operation activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Construction or operation activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Same as CUC.	Operation activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Same as CNC.	Same a No Action Alternative.
NTS	Current and planned activities would continue as required resulting in no additional impacts.	Minority population: 50 percent of ROI Low-Income population: 11 percent of ROI Construction or operation activities would not result in any disproportionately high or adverse effects on minority or	Construction activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Same as CUC.	Operation activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Same as CNC.	NTS would be unaffected by the Capability Based Alternative.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
		low-income populations.					
Pantex	Current and planned activities would continue resulting in no disproportionate impacts to the 21% minority population or the 44,312 individuals living near the Pantex Plant identified as living below the Federal poverty level.	Minority population: 30.1 percent of ROI Low-Income population: 14 percent of ROI Construction or operation activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Construction activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	Operation activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
SRS	Current activities and the construction and operation of the MOX/PDCF facilities are not expected to disproportionately impact the minority groups or 109,296 identified as living below the Federal poverty threshold living near SRS.	Minority population: 40.1 percent of ROI Low-Income population: 9 percent of ROI Construction or operation activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Construction activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Same as CUC.	Operation activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Same as CNC.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
Y-12	Current and planned activities would continue resulting in no disproportionate impacts to the 7 % minority population or the 122,216 individuals living near Y-12 identified as living below the Federal poverty level.	Minority population: 11.1 percent of ROI Low-Income population: 12 percent of ROI Construction and operation activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Same as CPC.	Construction activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC impact.	Operation activities would not result in any disproportionately high or adverse effects on minority or low-income populations.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
	Health and Safety						
LANL	Current and planned activities would continue as required resulting in no additional impacts. SRS operations expected to cause total dose to the offsite MEI of 1.7 mrem/yr. Worker dose from pit production at TA-55 would be approximately 90 person-rem per year.	*Greenfield CPC:* Potential worker fatalities during construction: 0.6 *Upgrade:* 0.2 *50/80:* 0.1 *Greenfield CPC and Upgrade:* Collective dose to population during operations: 6.0×10^{-4} person-rem; 4×10^{-7} latent cancer fatalities (LCFs)	Potential worker fatalities during construction: 0.9. Collective dose to population during operations: 0.23 person-rem; 1×10^{-4} LCFs annually MEI dose: 0.077 mrem; 5×10^{-5} LCFs annually	Potential fatalities during construction: 2.6. Collective dose to population during operations: 1.3×10^{-4} person-rem; 7.8×10^{-8} LCFs annually MEI dose: 5.8×10^{-5} mrem; 3.5×10^{-11} LCFs annually	Collective dose to population during operations: 0.23 person-rem; 1×10^{-4} LCFs annually MEI dose: 0.077 mrem; 5×10^{-5} LCFs annually Worker dose: 344 person-rem; 0.21 LCFs annually.	Collective dose to population during operations: 0.23 person-rem; 1×10^{-4} LCFs annually MEI dose: 0.077 mrem; 5×10^{-5} LCFs annually Worker dose: 386 person-rem; 0.23 LCFs annually.	Collective dose to population during operations: 2.5×10^{-8} person-rem ; 1×10^{-11} LCFs. Worker dose from increased pit production at TA-55 would increase from 90 person-rem per year to 220

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
		MEI dose: 1.5×10^{-4} mrem; 9×10^{-11} LCFs annually. Worker dose: 333 person-rem; 0.20 LCFs annually. *50/80:* Collective dose to population during operations: 3.2×10^{-5} person-rem; 2×10^{-8} LCFs MEI dose: 7.7×10^{-6} mrem; 5×10^{-12} LCFs annually Worker dose: 154 person-rem; 0.09 LCFs annually.	Worker dose: 11 person-rem; 0.006 LCFs annually.	A/D/HE Center worker dose: 42 person-rem; 0.24 LCFs annually.			person-rem per year
LANL Plutonium Phaseout: If LANL is not selected as the site for the CPC or CNPC, NNSA proposes to phase-out NNSA plutonium operations and remove Category I/II SNM from LANL by approximately 2022. Phasing out the plutonium operations from TA-55 would result in a decrease in the potential health impacts to LANL employees and the population surrounding LANL. Radiation doses to workers would be expected to decrease by approximately 220 person-rem. Plutonium emissions would decrease by approximately 0.00084 Curies.							
NTS	Current and planned activities would continue as required resulting in no additional impacts. NTS operations expected to produce MEI dose of approximately 0.2 mrem/yr.	Potential worker fatalities during construction: 0.7. Collective dose to population during operations: 2.4×10^{-5} person-rem; 1×10^{-8} LCFs. MEI dose: 1.1×10^{-5} mrem; 6×10^{-12} LCFs annually. Worker dose: 333 person-rem; 0.20 LCFs annually.	Potential worker fatalities during construction: 0.9. Collective dose to population during operations: 9.5×10^{-3} person-rem; 6×10^{-6} LCFs. MEI dose: 4.1×10^{-3} mrem; 2×10^{-9} LCFs annually. Worker dose: 11 person-rem; 0.006 LCFs annually.	Potential worker fatalities during construction: 0.2. Collective dose to population during operations: 7.3×10^{-6} person-rem; 4.0×10^{-9} LCFs annually MEI dose: 3.1×10^{-6} mrem; 1.9×10^{-12} LCFs annually Worker dose: 42 person-rem; 0.24 LCFs annually.	Collective dose to population during operations: 9.5×10^{-3} person-rem; 6×10^{-6} LCFs. MEI dose: 4.1×10^{-3} mrem; 2×10^{-9} LCFs annually Worker dose: 344 person-rem; 0.21 LCFs annually.	Collective dose to population during operations: 9.5×10^{-3} person-rem; 6×10^{-6} LCFs. MEI dose: 4.1×10^{-3} mrem; 2×10^{-9} LCFs annually Worker dose: 386 person-rem; 0.23 LCFs annually.	NTS would be unaffected by the Capability-Based Alternative.
Pantex	Current and planned activities would result in a dose to the MEI of 4.28 x 10^{-9} person-rem per year.	Potential worker fatalities during construction: 0.7. Collective dose to population during operations: 8.1×10^{-5} person-rem; 5×10^{-8} LCFs. MEI dose: 4.1×10^{-5} mrem;	Potential worker fatalities during construction: 0.9 Collective dose to population during operations: 0.033 person-rem; 2×10^{-5} LCFs.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	Collective dose to population during operations: 0.033 person-rem; 2×10^{-5} LCFs. MEI dose: 0.016 mrem; 1×10^{-8} LCFs annually.	Reduced operations would reduce the number of workers involved in radiological operations from approximately 334 to 250. Total

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
		2×10^{-11} LCFs annually. Worker dose: 333 person-rem; 0.20 LCFs annually.	MEI dose: 0.016 mrem; 1×10^{-8} LCFs annually. Worker dose: 11 person-rem; 0.006 LCFs annually.			Worker dose: 386 person-rem; 0.23 LCFs annually.	worker dose reduced from 44.1 person-rem to 33 person-rem. Statistically, LCFs would be reduced from 2.6×10^{-2} to 2.0×10^{-2}.
SRS	Current dose to the MEI from SRS operations is approximately 0.05 mrem/yr. Operation of the MOX/PDCF facilities is expected to add less than 1.8 person-rem to the 50 mile population surrounding SRS.	Potential worker fatalities during construction: 0.7. Collective dose to population during operations: 1.5×10^{-4} person-rem; 9×10^{-7} LCFs. MEI dose: 2.0×10^{-6}mrem; 1×10^{-12} LCFs annually Worker dose: 333 person-rem; 0.20 LCFs annually.	Potential worker fatalities during construction: 0.9. Collective dose to population during operations: 0.06 person-rem; 4×10^{-5} LCFs. MEI dose: 8.2×10^{-4} mrem; 5×10^{-10} LCFs annually. Worker dose: 11 person-rem; 0.006 LCFs annually.	Potential worker fatalities during construction: 2.6. Collective dose to population during operations: 4.5×10^{-5} person-rem; 2.7×10^{-8} LCFs. MEI dose: 6.2×10^{-7} mrem; 3.7×10^{-12} LCFs annually. Worker dose: 42 person-rem; 0.24 LCFs annually.	Collective dose to population during operations: 0.06 person-rem; 4×10^{-5} LCFs. MEI dose: 8.2×10^{-4} mrem; 5×10^{-10} LCFs annually Worker dose: 344 person-rem; 0.21 LCFs annually	Collective dose to population during operations: 0.06 person-rem; 4×10^{-5} LCFs. MEI dose: 8.2×10^{-4} mrem; 5×10^{-10} LCFs annually Worker dose: 386 person-rem; 0.23 LCFs annually.	Reduced tritium operations would reduce the total tritium worker dose from 4.1 person-rem to 3.1 person-rem. Statistically, the number of LCFs would be reduced from 2.5×10^{-3} to 1.9×10^{-3}.
Y-12	Current and planned activities are expected to result in a dose to the MEI of about 0.4 mrem/yr.	Potential worker fatalities during construction of CPC: 0.6 Collective dose to population during CPC operations: 3.2×10^{-3} person-rem; 2×10^{-6} LCFs. MEI dose: 4.5×10^{-4} mrem; 3×10^{-10} LCFs annually. Worker dose: 333 person-rem; 0.20 LCFs annually.	Potential worker fatalities during construction of UPF: 0.7. Collective dose to population during UPF operations: 1.2 person-rem; 7×10^{-4}LCFs. MEI dose: 0.2 mrem; 1×10^{-7} LCFs annually. UPF worker dose: 12.6 person-rem; 0.008 LCFs annually.	Potential worker fatalities during construction: 0.2. Collective dose to population during A/D/HE Center operations: 9.2×10^{-4} person-rem; 6×10^{-7} LCFs. MEI dose: 1.3×10^{-4}mrem; 8×10^{-10} LCFs annually Worker dose: 42 person-rem; 0.24 LCFs annually.	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC impact.	Collective dose to population during operations: 1.2 person-rem; 7×10^{-4}LCFs. MEI dose: 0.2 mrem; 1×10^{-7} LCFs annually. Worker dose: 386 person-rem; 0.23 LCFs annually.	Reduced operations would reduce the number of workers involved in radiological operation from approximately 839 to 500, reducing the total worker dose from 32. person-rem to 19.1 person-rem. Statistically, the number of LCFs would be reduced from 1.9×10^{-2} to 1.1×10^{-2}.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
Facility Accidents							
LANL	Current and planned activities would continue as required resulting in no additional impacts. Under all alternatives analyzed in the LANL SWEIS, the facility accident with the highest radiological risk to the offsite population would be a lightning strike fire at the Radioassay and Nondestructive Testing Facility located in TA-54. If this accident were to occur, there could be 6 additional LCFs in the offsite population.	Accident with the highest consequences to the offsite population is the beyond evaluation basis earthquake and fire. Approximately 26 LCFs in the offsite population could result from such an accident. Offsite maximally exposed individual (MEI) would receive a dose of 87.5 rem. Statistically, MEI would have 1 chance in 19 of LCF. When probabilities are taken into account, the accident with the highest risk is the explosion in a feed casting furnace. For this accident, the LCF risk to the MEI would be approximately 9×10^{-4}, or approximately 1 in 1,000. For the population, the LCF risk would be 0.19, or approximately 1 in 5.	Accident with the highest consequences to the offsite population is the fire in the EU warehouse. Approximately 0.06 LCFs in the offsite population could result from such an accident. Offsite MEI individual would receive a maximum dose of 0.249 rem. Statistically, the MEI would have 1 chance in 7,000 of LCF. When probabilities are taken into account, the accident with the highest risk is the design-basis fire for HEU storage. For this accident, the maximum LCF risk to the MEI would be approximately $1.6\text{x}10^{-7}$, or less than one in a million. For the population, the LCF risk would be 7.2×10^{-5}, or approximately 1 in 10,000.	Accident with the highest consequences to the offsite population is the explosive driven plutonium and tritium dispersal from an internal event Approximately 3 LCFs in the offsite population could result from such an accident. Offsite MEI would receive a dose of 73.8 rem. Statistically, this MEI would have 1 chance in 23 of an LCF. When probabilities are taken into account for this accident, the LCF risk to the MEI would be approximately 9×10^{-6}, or approximately 1 in 100,000. For the population, the LCF risk would be 3×10^{-4}, meaning that an LCF would statistically occur once every 3,000 years in the population.	See CPC and CUC.	See CPC and CUC and A/D/HE.	Same as No Action Alternative.
LANL Plutonium Phaseout: If LANL is not selected as the site for the CPC or CNPC, NNSA proposes to phase-out NNSA plutonium operations and remove Category I/II SNM from LANL by approximately 2022. Phasing out the plutonium operations from TA-55 would result in a decrease in the potential accident impacts to LANL employees and the population surrounding LANL.							
NTS	Current and planned activities would continue as required resulting in no additional impacts. The maximum reasonably foreseeable accident at the NTS would be a non-nuclear explosion involving high explosives in a storage bunker, which has al probability of occurrence of 1 in 10,000,000. The following consequences are estimated if	Accident with the highest consequences to the offsite population is the beyond evaluation basis earthquake and fire. Approximately 0.5 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a dose of approximately 2 rem. Statistically, the MEI would have a 0.001 chance of	Accident with the highest consequences to the offsite population is fire in the EU warehouse. Approximately 0.0008 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a maximum dose of 0.0037 rem. Statistically, the LCF risk to the MEI would be approximately $2\text{x}10^{-6}$, or	Accident with the highest consequences to the offsite population is the explosive driven plutonium and tritium dispersal from an internal event. Approximately 0.06 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a dose of 0.29	See CPC and CUC.	See CPC and CUC and A/D/HE.	NTS would be unaffected by the Capability Based Alternative.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
	such an accident occurs: MEI dose of 34 rem, which would result in a 0.02 probability of an LCF; population dose of 5,800 to 110,000 person-rem, which would result in 3-55 LCFs.	developing a LCF (i.e., about 1 chance in 1,000 of an LCF). When probabilities are taken into account, the accident with the highest risk to the MEI is the explosion in a feed casting furnace. For this accident, the LCF risk to the MEI would be 6×10^{-6}, or approximately 1 in 150,000. For the population, the LCF risk would be approximately 2×10^{-3}, meaning that an LCF would statistically occur once every 400 years in the population.	about 1 in half a million. When probabilities are taken into account, the accident with the highest risk is the design-basis fire for HEU storage. For this accident, the maximum LCF risk to the MEI would be approximately $2x10^{-9}$, or about 1 in half a billion. For the population, the LCF risk would be approximately $9x10^{-7}$, or about 1 in a million.	rem. Statistically, this MEI would have a 2×10^{-4} chance of developing a LCF (i.e., about 1 chance in 57,000 of an LCF). When probabilities are taken into account for this accident, the LCF risk to the MEI would be approximately $2x10^{-8}$, or less than 1 chance in a million. For the population, the LCF risk would be approximately $7x10^{-6}$, or approximately 1 in 150,000.			
Pantex	Current and planned activities would continue as required resulting in no additional impacts. Potential accident scenarios and impacts for the No Action Alternative would be the same as presented in the A/D/HE facility column.	Accident with the highest consequences to the offsite population is the beyond evaluation basis earthquake and fire. Approximately 5.9 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a dose of 23.1 rem. Statistically, the MEI would have a 0.01 chance of developing a LCF (i.e., about 1 chance in 100 of an LCF). . When probabilities are taken into account, the accident with the highest risk to the MEI is the explosion in a feed casting furnace. For this accident, the LCF risk to the MEI would be approximately $8x10^{-5}$, or approximately one in 10,000. For the population, the LCF risk would be $3x10^{-2}$, meaning that an LCF would statistically occur once every 31 years in the population.	Accident with the highest consequences to the offsite population is the aircraft crash into the EU facilities. Approximately 0.02 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a maximum dose of 0.07 rem. Statistically, this MEI would have a 0.00004 chance of developing a LCF, or about 1 in 25,000. When probabilities are taken into account, the accident with the highest risk is the design-basis fire for HEU storage. For this accident, the maximum LCF risk to the MEI would be approximately $3x10^{-8}$, or approximately 1 in 33 million. For the population, the LCF risk would be $1x10^{-5}$, or approximately 1 in 100,000.	Accident with the highest consequences to the offsite population is the explosive driven plutonium and tritium dispersal from an internal event. Approximately 0.9 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a dose of 3.6 rem. Statistically, this MEI would have a 0.002 chance of developing a LCF (i.e., about 1 chance in 500 of an LCF). When probabilities are taken into account for this accident, the LCF risk to the MEI would be $2x10^{-7}$, or approximately 1 in 5 million. For the population, the LCF risk would be approximately $9x10^{-5}$, or approximately 1 in 10,000.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	See CPC and CUC and A/D/HE.	Planned activities would continue as required to support smaller stockpile requirements. It is anticipated that performing an operation less frequently would have a linear reduction in the overall probability that an accident would occur.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
				Note: the accidents described above are for the existing A/D/HE mission. No A/D/HE Center is proposed at Pantex because Pantex currently conducts this mission.			
SRS	Current and planned activities would continue as required resulting in no additional impacts. The bounding accident at SRS, which is associated with the plutonium disposition program, would cause an MEI dose of approximately 8.8 rem. The maximum population dose was 21,000 rem, which would equate to approximately 12.6 LCFs.	Accident with the highest consequences to the offsite population is the beyond evaluation basis earthquake and fire. Approximately 10.5 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a dose of approximately 3 rem. Statistically, the MEI would have a 0.002 chance of developing a LCF, or about 1 in 500. When probabilities are taken into account, the accident with the highest risk to the MEI is the explosion in a feed casting furnace. For this accident, the LCF risk to the MEI would be 1×0^{-5}, or approximately 1 in 100,000. For the population, the LCF risk would be approximately 6×10^{-2}, meaning that an LCF would statistically occur once every 18 years in the population.	Accident with the highest consequences to the offsite population is the aircraft crash into the EU facilities. Approximately 0.03 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a maximum dose of 0.01 rem. Statistically, this MEI would have a $7\text{x}10^{-6}$ chance of developing a LCF, or about 1 in 150,000. When probabilities are taken into account, the accident with the highest risk is the design-basis fire for HEU storage. For this accident, the maximum LCF risk to the MEI would be $4\text{x}10^{-9}$, or approximately 1 in 250 million. For the population, the LCF risk would be $2\text{x}10^{-5}$, or approximately 1 in 50,000.	Accident with the highest consequences to the offsite population is the explosive driven plutonium and tritium dispersal from an internal event. Approximately 1.49 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a dose of 0.5 rem. Statistically, this MEI would have a 0.0003 chance of developing a LCF, or about 1 in 3,300. When probabilities are taken into account for this accident, the LCF risk to the MEI would be $3\text{x}10^{-8}$, or approximately 1 in 33 million. For the population, the LCF risk would be $1\text{x}10^{-4}$, or approximately 1 in 6,500.	See CPC and CUC	See CPC and CUC and A/D/HE	Planned activities would continue as required to support smaller stockpile requirements. It is anticipated that performing an operation less frequently would have a linear reduction in the overall probability that an accident would occur.
Y-12	Current and planned activities would continue as required resulting in no additional impacts. Potential accident	Accident with the highest consequences to the offsite population is the beyond evaluation basis earthquake	Accident with the highest consequences to the offsite population is the fire in the UPF warehouse.	Accident with the highest consequences to the offsite population is the explosive driven	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC	See CPC and UPF and A/D/HE	Planned activities would continue as required to support smaller stockpile

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
	scenarios and impacts for the No Action Alternative would be the same as presented in the UPF facility column.	and fire. Approximately 177 LCFs in the offsite population could result from this accident. An offsite MEI would receive a dose of 219 rem. Statistically, the MEI would have a 0.1 chance of developing a LCF, or about 1 in 10. When probabilities are taken into account, the accident with the highest risk to the MEI is the explosion in a feed casting furnace. For this accident, the LCF risk to the MEI would be $2x10^{-3}$, or approximately 1 in 500. For the population, the LCF risk would be 1.07, meaning that approximately 1 LCF would statistically occur once every year in the population.	Approximately 0.4 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a maximum dose of 0.7 rem. Statistically, this MEI would have a $4x10^{-4}$ chance of developing a LCF, or about 1 in 2,400. When probabilities are taken into account, the accident with the highest risk is the design-basis fire for HEU storage. For this accident, the maximum LCF risk to the MEI would be $4x10^{-7}$, or about 1 in 2.5 million. For the population, the LCF risk would be $4x10^{-4}$, or about 1 in 2,500. **Note: the accidents described above are for the UPF. No CUC is proposed at Y-12 because Y-12 currently conducts this mission.**	plutonium and tritium dispersal from an internal event. Approximately 28.9 LCFs in the offsite population could result from such an accident. An offsite MEI would receive a dose of 55 rem. Statistically, this MEI would have a 0.03 chance of developing a LCF, or about 1 in 30. When probabilities are taken into account for this accident, the LCF risk to the MEI would be $7x10^{-6}$, or about 1 in 150,000. For the population, the LCF risk would be $3x10^{-3}$, or about 1 in 350.	impact.		requirements. It is anticipated that performing an operation less frequently would have a linear reduction in the overall probability that an accident would occur.
	Transportation						
LANL	Current and planned activities would continue as required resulting in no additional impacts.	Under all approaches increase in traffic during construction and operation would occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels. If NNSA Category I/II SNM missions are phased out, all	Increase in traffic during construction would occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Same as CUC.	Increased traffic from the addition of new employees would also occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Same as CNC.	Same as No Action Alternative.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
		Category I/II inventories of radioactive material would be transferred to other sites w/in the NNSA Complex.					
LANL Plutonium Phaseout: If LANL is not selected as the site for the CPC or CNPC, NNSA proposes to phase-out NNSA plutonium operations and remove Category I/II SNM from LANL by approximately 2022. Phasing out the plutonium operations from TA-55 would result in a decrease in waste generated at LANL. LLW would decrease by approximately 11%, Mixed LLW would decrease by 14%; TRU would decrease by 80%.							
NTS	Current and planned activities would continue as required resulting in no additional impacts.	Increase in traffic during construction and operation would occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Increase in traffic during construction would occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Same as CUC.	Increased traffic from the addition of new employees would also occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Same as CNC.	NTS would be unaffected by the Capability Based Alternative.
Pantex	Current and planned activities would continue as required resulting in no additional impacts.	Increase in traffic during construction and operation would occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Increase in traffic during construction would occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	Increased traffic from the addition of new employees would also occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Planned activities would continue as required to support smaller stockpile requirements resulting in no additional impacts.
SRS	Increases to traffic during the construction and operation period of the MOX/PDCF facilities would occur. The impacts would be small in comparison to existing traffic and during the construction period could be eased with additional security guards detailed to SRS access points during the rush hours.	Increase in traffic during construction and operation would occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels. Radiological transportation would include transport of pits from Pantex to SRS and recycle of EU parts to Y-12.	Increase in traffic during construction would occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Same as CUC.	Radiological transportation would include the impacts associated with the CPC plus transport of EU parts to and from Pantex. There would also be a one-time transport of HEU from Y-12 to the CNC. Increased traffic from the addition of new employees would also occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Radiological transportation would include transport of TRU waste. There would be a one-time transport of SNM from Y-12 and Pantex to the CNPC. Increased traffic from the addition of new employees would also occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Reduction in employees would have an inconsequential impact on traffic. A reduction in tritium operations would reduce the transportation of tritium.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
Y-12	Current and planned activities would continue as required resulting in no additional impacts.	Increase in traffic during construction and operation would occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels. Radiological transportation for the CPC would include transport of pits from Pantex to Y-12, return of pits and EU parts to Pantex, and shipment of TRU waste to WIPP.	Radiological transportation for the UPF would include transport of EU parts to/from Pantex, and shipment of LLW to NTS.	Increase in traffic during construction and operation would occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Y-12 performs the CUC mission, therefore the impact of a CNC at this site is identical to the CPC impact.	Radiological transportation of impacts associated with CPC and UPF would not occur, with the exception of TRU waste transportation. There would be a one-time transport of SNM from Pantex to the CNPC. Increased traffic from the addition of new employees would also occur. Although this traffic increase would tend to exacerbate congestion on local roads, the increase would be small compared to the average daily traffic levels.	Reduction in employees could cause a short-term decrease in road congestion. Reduction operation would reduce the transportation of secondaries and cases by approximately 50% compared to the No Action Alternative.
	Waste Management						
LANL	Current and planned activities would continue as required resulting in no additional impacts. Wastes in 2005 were as follows: LLW (yd^3): 7,080 Mixed LLW (yd^3): 90 TRU Waste(yd^3): 100 Mixed TRU(yd^3): 130 Hazardous (lbs.): 43,400 Existing waste management facilities are sufficient to manage these levels and maintain compliance with all regulatory requirements.	**Construction (Greenfield/Upgrade/50/80 Upgrade)** TRU solid (yd^3): 0/200/0 LLW solid (yd^3): 0/200/0 Hazardous (yd^3): 6.5/4/4 **Operation (Greenfield/Upgrade/50/80 Upgrade)** TRU solid (yd^3): 850/850/575 Mixed TRU(yd^3):310/310/2.6 LLW solid (yd^3): 3,500/3,500/1,850 LLW liq (yd^3): 0/0/19.5 Non-hazardous solid (yd^3): 7,400/7,400/700 Non-hazardous liquid (gal): 69,500/69,500/16,000	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 70 Mixed TRU solid (yd^3): 0 Hazardous (tons): 6 Non-hazardous solid (tons): 1,000 **Operation** TRU solid (yd^3): 0 LLW liquid (gal):3,515 LLW solid (yd^3): 8,100 Mixed LLW liquid (gal): 3,616 Mixed LLW solid (yd^3): 70 Mixed TRU solid (yd^3): 0 Hazardous solid (tons): 15 Hazardous liquid (tons): 0 Non-hazardous solid (yd^3): 7,500 Non-hazardous liquid (gal): 50,000	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 9,900 Mixed TRU solid (yd^3): 0 Hazardous (tons): 0 Non-hazardous solid (tons): 7,100 Non-hazardous liquid (gal): 40,000 **Operation** Low Level Liquid Waste (gal): 5,410 Low Level Solid Waste (yd^3): 40 Mixed Low Level Liquid Waste (gal): 6 Hazardous waste solid (yd^3): 1,350 Hazardous waste liquid (gal): 8,850 Non-hazardous Solid Waste (yd^3): 15,000 Non-hazardous Liquid Waste (gal):46,000		TRU solid (yd^3): 850 LLW liquid (gal):8,925 LLW solid (yd^3): 11,640 Mixed LLW liquid (gal): 3,622.4 Mixed LLW solid (yd^3): 72.3 Mixed TRU solid (yd^3): 310 Hazardous solid ((yd^3): 1,368.6 Hazardous liquid (gal): 8,850.5 Non-hazardous solid (yd^3): 29,900 Non-hazardous liquid (gal): 165,500	Same a No Action Alternative.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
NTS	Current and planned activities would continue as required resulting in no additional impacts. Wastes from 2001 LLW (yd^3): 0 Hazardous (tons): 4.86 Sanitary (tons): 4,550 Existing waste management facilities are sufficient to manage these levels and maintain compliance with all regulatory requirements.	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 0 Mixed TRU solid (yd^3): 0 Hazardous (tons): 7 Non-hazardous solid (yd^3): 10,900 Non-hazardous liquid (gal): 56,000 **Operation** TRU solid (yd^3): 950 LLW liquid (yd^3): 0 LLW solid (yd^3): 3,900 Mixed LLW liquid (yd^3): 0.4 Mixed LLW solid (yd^3): 2.5 Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 4.0 Hazardous liquid (tons): 0.6 Non-hazardous solid (yd^3): 8,100 Non-hazardous liquid (gal): 75,000	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 70 Mixed TRU solid (yd^3): 0 Hazardous (tons): 6 Non-hazardous solid (tons): 1,000 **Operation** TRU solid (yd^3): 0 LLW liquid (gal):3,515 LLW solid (yd^3): 8,100 Mixed LLW liquid (yd^3): 3,616 Mixed LLW solid (yd^3): 70 Mixed TRU solid (yd^3): 0 Hazardous solid (tons): 15 Hazardous liquid (tons): 0 Non-hazardous solid (yd^3): 7,500 Non-hazardous liquid (gal): 50,000	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 9,000 Mixed TRU solid (yd^3): 0 Hazardous (tons): 0 Non-hazardous solid (yd^3): 6,400 Non-hazardous liquid (gal): 40,000 **Operation** Low Level Liquid Waste (gal): 5,410 Low Level Solid Waste (yd^3): 40 Mixed Low Level Liquid Waste (gal): 6 Hazardous waste solid (tons): .90 Hazardous waste liquid (tons): 5.9 Non-hazardous Solid Waste (yd^3): 12,000 Non-hazardous Liquid Waste (gal):46,000	TRU solid (yd^3): 950 LLW liquid (gal):3,515 LLW solid (yd^3): 12,000 Mixed LLW liquid (yd^3): 3,616.4 Mixed LLW solid (yd^3): 72.5 Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 19 Hazardous liquid (tons): 0.6 Non-hazardous solid (tons): 15,600 Non-hazardous liquid (gal): 125,000	TRU solid (yd^3): 950 LLW liquid (gal):8,925 LLW solid (yd^3): 12,640 Mixed LLW liquid (yd^3): 3,622.4 Mixed LLW solid (yd^3): 782.5 Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 19.9 Hazardous liquid (ton): 6.5 Non-hazardous solid (yd^3): 27,600 Non-hazardous liquid (gal): 171,000	NTS would be unaffected by the Capability Based Alternative.
Pantex	The following existing levels of waste generation would be expected to continue: Wastes from 2005 LLW (yd^3): 96.8 Mixed LLW (yd^3): 1.8 Hazardous (yd^3): 711 Non-hazardous (yd^3): 6,375 Sanitary (yd^3): 944.9 TSCA (yd^3): 2,036 Universal (yd^3): 31 Existing waste management facilities are sufficient to manage these levels and maintain compliance with all regulatory requirements.	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 0 Mixed TRU solid (yd^3): 0 Hazardous waste (tons): 7 Non-hazardous solid (yd^3): 10,900 Non-hazardous liquid (gal): 56,000 **Operation** TRU solid (yd^3): 950 LLW liquid (yd^3): 0 LLW solid (yd^3): 3,900 Mixed LLW liquid (yd^3): 0.4 Mixed LLW solid (yd^3): 2.5 Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 4.0 Hazardous liquid (tons): 0.6 Non-hazardous solid (yd^3): 8,100	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 70 Mixed TRU solid (yd^3): 0 Hazardous (tons): 6 Non-hazardous solid (tons): 1,000 **Operation** TRU solid (yd^3): 0 LLW liquid (yd^3):3,615 LLW solid (yd^3): 8,100 Mixed LLW liquid (yd^3): 3,620 Mixed LLW solid (yd^3): 70 Mixed TRU solid (yd^3): 0 Hazardous solid (tons): 15 Hazardous liquid (tons): 0 Non-hazardous solid (yd^3): 7,500	No A/D/HE Center is proposed at Pantex because the A/D/HE mission is part of the No Action Alternative.	Pantex performs the A/D/HE mission; therefore the impact of a CNC at this site is identical to the CNPC impact. See CNPC Operation in next column.	TRU solid (yd^3): 950 LLW liquid (yd^3):3,615 LLW solid (yd^3): 12,000 Mixed LLW liquid (yd^3): 3,620 Mixed LLW solid (yd^3): 72.5 Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 19 Hazardous liquid (tons): 0.6 Nonhazardous solid (yd^3): 15,600 Nonhazardous liquid (yd^3): 125,000	Current and planned activities would continue as required to support smaller stockpile requirements. LLW (yd^3): 73 Mixed LLW (yd^3): 1.4 Hazardous (yd^3): 530 Non-hazardous (yd^3): 4,800 No major impacts are expected.

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	**CUC (or UPF at Y-12)**	**A/D/HE**	**CNC Operation**	**CNPC Operation**	
		Non-hazardous liquid (yd^3): 75,000	Non-hazardous liquid (gal): 50,000				
SRS	Existing levels of waste generation of: Wastes from 2001 TRU (yd^3): 64.1 LLW (yd^3): 4,610 Mixed TRU (yd^3): 380 Hazardous (yd^3): 45.3 Sanitary (yd^3): 1,560 And are expected to be increased by the construction of t he MOX/PDCF facilities which are expected to add: TRU (yd^3): 500 LLW (yd^3): 270 Mixed (yd^3): 6.5 Existing waste management facilities are more than adequate to manage these wastes in compliance with all regulatory requirements.	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 0 Mixed TRU solid (yd^3): 0 Hazardous (tons): 7 Non-hazardous solid (yd^3): 10,900 Non-hazardous liquid (gal): 56,000 **Operation** TRU solid (yd^3): 950 LLW liquid (yd^3): 0 LLW solid (yd^3): 3,900 Mixed LLW liquid (yd^3): 0.4 Mixed LLW solid (yd^3): 2.5 Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 4.0 Hazardous liquid (tons): 0.6 Non-hazardous solid (yd^3): 8,100 Non-hazardous liquid (gal): 75,000	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 70 Mixed TRU solid (yd^3): 0 Hazardous (tons): 6 Non-hazardous solid (tons): 1,000 **Operation** TRU Solid Waste (yd^3): 0 Low Level Liquid Waste (yd^3): 3,515 Low Level Solid Waste (yd^3): 8,100 Mixed Low Level Liquid Waste (yd^3): 3,616 Mixed Low Level Solid Waste (yd^3): 70 Mixed TRU Solid Waste (yd^3): 0 Hazardous waste solid (tons): 15 Hazardous waste liquid (tons): 0 Non-Hazardous Solid Waste (tons): 7,500 Non-Hazardous Liquid Waste (gal) : 50,000	**Construction** TRU solid (yd^3):0 LLW solid (yd^3): 9,900 Mixed TRU solid (yd^3): 0 Hazardous (tons): 0 Non-hazardous solid (tons): 7,1000 Non-hazardous liquid (gal): 45,000 **Operation** Low Level Liquid Waste (gal): 5,410 Low Level Solid Waste (yd^3): 40 Mixed Low Level Liquid Waste (gal): 6 Hazardous waste solid (tons): .90 Hazardous waste liquid (tons): 5.9 Non-hazardous Solid Waste (yd^3): 12,000 Non-hazardous Liquid Waste (gal):46,000	TRU solid (yd^3): 950 LLW liquid (gal):3,515 LLW solid (yd^3): 12,000 Mixed LLW liquid (yd^3): 3,616.4 Mixed LLW solid (yd^3): 72.5 Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 19 Hazardous liquid (tons): 0.6 Nonhazardous solid (tons): 15,600 Nonhazardous liquid (gal): 125,000	TRU solid (yd^3): 950 LLW liquid (gal):8,925 LLW solid (yd^3): 12,040 Mixed LLW liquid (yd^3): 3,622.4 Mixed LLW solid (yd^3): 782.5 Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 19.9 Hazardous liquid (tons): 6,5 Nonhazardous solid (yd^3): 27,600 Nonhazardous liquid (gal): 171,000	Reduced tritium operations would reduce LLW by approximately 50%, from 138 yd^3 to approximately 69 yd^3. No other waste streams would be affected.
Y-12	Wastes generated in 2003: LLW liquid (yd^3): 17.4 LLW solid (yd^3): 7,800 Mixed LLW liquid (yd^3): 17.9 Mixed LLW solid (yd^3): 21.1 Existing waste management facilities are more than	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 0 Mixed TRU solid (yd^3): 0 Hazardous (tons): 7 Non-hazardous solid (tons): 10,900 Non-hazardous liquid (gal): 56,000 **Operations** TRU solid (yd^3): 950 LLW liquid (yd^3):0 LLW solid (yd^3): 3,900 Mixed LLW liquid (gal): 0.4 Mixed LLW solid (yd^3): 2.5	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 70 Mixed LLW solid (yd^3): 4 Hazardous (tons): 4 Non-hazardous solid (tons): 800 Non-hazardous liquid (gal): 0 **Operations** TRU solid (yd^3): 0 LLW liquid (gal):3,515 LLW solid (yd^3): 7,800 Mixed LLW liquid (gal): 3,616	**Construction** TRU solid (yd^3): 0 LLW solid (yd^3): 9,900 Mixed TRU solid (yd^3): 0 Hazardous (tons): 0 Non-hazardous solid (yd^3): 7,100 Non-hazardous liquid (gal): 45,000 **Operation** Low Level Liquid Waste (gal): 5,410 Low Level Solid Waste (yd^3): 40 Mixed Low Level Liquid	TRU solid (yd^3): 950 LLW liquid (gal): 3,515 LLW solid (yd^3): 11,700 Mixed LLW liquid (gal): 3,616.4 Mixed LLW solid (yd^3): 72.5 Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 19 Hazardous liquid (yd^3): 0.6 Non-hazardous solid (tons): 15,600 Non-hazardous liquid (gal): 125,000	TRU solid (yd^3): 950 LLW liquid (gal): 8,925 LLW solid (yd^3): 11,740 Mixed LLW liquid (gal): 3,622.4 Mixed LLW solid (yd^3): 23.5 Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 18.9 Hazardous liquid (tons): 6.5 Non-hazardous solid (yd^3): 27,225 Non-hazardous liquid	LLW liquid (yd^3): 10.4 LLW solid (yd^3): 4,700 Mixed LLW liquid (yd^3): 10.7 Mixed LLW solid (yd^3): 12.7

Table 3.16-1—Comparison of Environmental Impacts Among Programmatic Alternatives (continued)

SITE	NO ACTION ALTERNATIVE	Major New Restructured SNM Facilities in the DCE and CCE Alternatives					CAPABILITY BASED ALTERNATIVE*
		CPC	CUC (or UPF at Y-12)	A/D/HE	CNC Operation	CNPC Operation	
	adequate to manage these wastes in compliance with all regulatory requirements	Mixed TRU solid (yd^3): 340 Hazardous solid (tons): 4.0 Hazardous liquid (yd^3): 0.6 Non-hazardous solid (tons): 8,100 Non-hazardous liquid (gal): 75,000	Mixed LLW solid (yd^3): 70 Mixed TRU solid (yd^3):0 Hazardous solid (tons): 15 Hazardous liquid (yd^3): 0 Non-hazardous solid (tons): 7,500 Non-hazardous liquid (gal): 50,000	Waste (gal): 6 Hazardous waste solid (tons): .90 Hazardous waste liquid (tons): 5.9 Non-hazardous Solid Waste (yd^3): 12,000 Non-hazardous Liquid Waste (gal):46,000		(gal): 171,000	

*****Data is presented for Capability-Based Alternative. The No Net Production/Capability-Based Alternative is discussed in Chapter 5, as appropriate for any potentially-affected site. The No Net Production Capability-Based Alternative would result in less weapons-related activities at NNSA sites. This would translate into smaller infrastructure demands, less waste generation, less dose to workers, and reductions in employment. Although these changes would vary differently at the NNSA sites (see Section 3.6.2), most reductions would be on the order of approximately 10 percent compared to the Capability-Based Alternative.

Table 3.16-2—Summary of Impact Comparison of SNM Consolidation: Transfer SNM from LLNL

Resource	No Action Alternative	Remove Category I/II SNM from LLNL (Includes the impacts of phasing out Category I/II SNM operations from LLNL Superblock)—Preferred Alternative
Land	No land issues	No land impacts or issues
Noise	No noise impacts	No change
Air Quality	No changes to air quality	• no emissions of radionuclides to air from Superblock; therefore, phasing out this facility would have no effect on radiological air quality • no nonradiological changes expected
Socioeconomic	No change	• if Superblock operated as Category III SNM facility: minor impacts to facility employment associated with security force reductions • if Superblock closed and undergoes D&D: employment would be expected to increase because of the D&D work, but would likely not be significant, and would be offset by the transfer of some personnel to LANL.
Transportation	No change. LLNL is authorized to transport approximately 584 shipments annually.	• less than 19 shipments of radiological material expected • population dose for all shipments: < 3 person-rem • LCF risk: <0.01
Human Health	There are no emissions of radionuclides from Superblock.	• phasing out Category I/II SNM operations from Superblock would have no effect on population doses to the surrounding population. • material-at-risk limit for Superblock reduced by 60%; • bounding accident source term for Superblock reduced by 60% • Superblock accident consequences reduced from 1.3 LCFs to 0.52 LCFs.
Waste Management	Small quantities of hazardous, and liquid and solid non-hazardous wastes	• if Superblock operated as Category III SNM facility: wastes would drop to 10% of current quantities (to 10 TRU waste drums per year and 40 LLW drums per year) • if Superblock closed and undergoes D&D: waste would increase in short-term; for bounding case, wastes could double to 200 TRU waste drums and 800 LLW drums per year for several years

Table 3.16-3—Summary of Impact Comparison of SNM Consolidation: Transfer SNM from Pantex Zone 4 to Zone 12

Resource	No Action Alternative	Move Category I/II SNM Storage from Zone 4 to Newly Constructed Underground Storage Facility in Zone 12 at Pantex—Preferred Alternative
Land	No land issues	Would disturb 42-57 acres of brownfield land for construction; A maximum of 11 acres would be utilized once operational
Noise	No noise impacts	Minor increase in noise during construction of new 95,900-142,800 sq. ft. underground storage facility.
Water	Water use limited to personal consumption of employees	Would require an additional 1,500,000-2,950,000 gallons of water for 5-year construction period
Air Quality	No impacts to air from SNM storage	Minor fugitive dust emissions during construction of new underground storage facility
Socioeconomics	Currently employs 40 workers	No change
Transportation	No impacts	No impacts off site; all transportation on-site Human health impacts from transportation included under "Human Health"
Human Health	Average dose of 12 mrem to 10 radiological workers	Movement of material would entail an additional total dose of 1,100 person-rem, which would statistically translate into a maximum of approximately 0.657 LCFs
Waste Management	No waste generation	Once material moved D&D of old facility would be expected to generate: • 12,000 yd^3 of solid waste • 700 yd^3 of LLW

Table 3.16-4—Summary of Impact Comparison of Tritium R&D Alternatives

Resource	No Action	SRS Consolidation—Preferred Alternative	LANL Consolidation	Downsize-in-Place
Land	Continue operations at LLNL, LANL, and SRS	No new land disturbed	No new land disturbed	No new land disturbed
Noise	Continue operations at LLNL, LANL, and SRS	No change	No change*	No change
Air Quality	Continue operations at LLNL, LANL, and SRS No change	• SRS tritium emissions increase by 1,000 Curies (2.4% increase over current tritium emissions) • LANL tritium emissions decrease by 1,000 Curies (42% decrease compared to current tritium emissions) • No change to nonradiological emissions	No change*	No change
Socioeconomic	Continue operations at LLNL, LANL, and SRS No change	• 25 jobs restructured at LANL • 25 new jobs would be created at SRS	No change*	No change
Human Health	Continue operations at LLNL, LANL, and SRS	• Average exposure to worker from tritium R&D would be approximately 4.3 mrem • Total worker dose: 0.11 person-rem • Worker LCF risk: 6.6×10^{-5} • MEI dose at SRS: increase by 0.0008 mrem/year; • 50-mile population dose: increase 0.041 person-rem. • LANL decreases would be similarly small	No change*	No change
Waste Management	Continue operations at LLNL, LANL, and SRS	Wastes would change by less than 1%	No change*	No change

* Consolidation to LANL includes LLNL tritium R&D activities, which amount to one glovebox system.

Table 3.16-5—Summary of Impact Comparison of HE R&D Alternatives*

Resource	No Action	Consolidate HE R&D to LANL	Consolidate HE R&D to LLNL	Consolidate HE R&D to Pantex	Consolidate HE R&D to SNL/NM	Consolidate HE R&D to NTS
Donor Sites	Not Applicable	SNL/NM, LLNL, Pantex	SNL/NM, LANL, Pantex	SNL/NM, LLNL, LANL	Pantex, LLNL, LANL	SNL/NM, LLNL, Pantex, LANL
Land	Continue operations at LANL, LLNL, SNL/NM, Pantex	5 acres disturbed at LANL in vicinity of the Two-Mile Mesa Complex (includes portions of TA-6, TA-22, and TA-40)	8-10 acres disturbed on main LLNL site near the HEAF	5.7 acres disturbed in vicinity of Zone 11 and Zone 12	13.5 acres disturbed in Technical Areas 2 or 3	15 acres disturbed in vicinity of the BEEF
Noise	Continue operations at LANL, LLNL, SNL/NM, Pantex	"thunder-like" explosives testing; noise occasional, not continuous; public, and sensitive wildlife receptors unlikely to be adversely impacted	None detectable outside of HEAF.	"thunder-like" explosives testing; noise occasional, not continuous; public, and sensitive wildlife receptors unlikely to be adversely impacted	"thunder-like" explosives testing; noise occasional, not continuous; public, and sensitive wildlife receptors unlikely to be adversely impacted	"thunder-like" explosives testing; noise occasional, not continuous; public, and sensitive wildlife receptors unlikely to be adversely impacted
Air Quality	Continue operations at LANL, LLNL, SNL/NM, Pantex	Short-term impacts from construction; Operation increases in pollutants would be less than 1% of site emissions. No radiological emissions.	Short-term impacts from construction; Operation increases in pollutants would be less than 1% of site emissions. No radiological emissions.	Short-term impacts from construction; Operation increases in pollutants would be less than 1% of site emissions. No radiological emissions.	Short-term impacts from construction; Operation increases in pollutants would be less than 1% of site emissions. No radiological emissions.	Short-term impacts from construction; Operation increases in pollutants would be less than 1% of site emissions. No radiological emissions.
Socioeconomic	Continue operations at LANL, LLNL, SNL/NM, Pantex	• 125 peak construction jobs; • LANL: +300 jobs • LLNL: -175 jobs • SNL/NM: -45 jobs • Pantex: -10 jobs	• 150 peak construction jobs; • LLNL: +300 jobs • LANL: -150 jobs • SNL/NM: -45 jobs • Pantex: -10 jobs	• 210 peak construction jobs; • Pantex: +160 jobs • LANL: -150 jobs • SNL/NM: -45 jobs • LLNL: -175 jobs	• 220 peak construction jobs; • SNL/NM: +325 jobs • LANL: -150 jobs • LLNL: -175 jobs • Pantex: -10 jobs	• 250-300 peak construction jobs; • NTS: +250 jobs • LLNL: -175 jobs • LANL: -150 jobs • SNL/NM: -45 jobs • Pantex: -10 jobs

Table 3.16-5—Summary of Impact Comparison of HE R&D Alternatives* (continued)

Resource	No Action	Consolidate HE R&D to LANL	Consolidate HE R&D to LLNL	Consolidate HE R&D to Pantex	Consolidate HE R&D to SNL/NM	Consolidate HE R&D to NTS
Human Health	Continue operations at LANL, LLNL, SNL/NM, Pantex	No change	No change	No change	No change	No change
Waste Management	Continue operations at LANL, LLNL, SNL/NM, Pantex	Construction solid waste: 4,930 cubic yards. Operational wastes minimal.	Construction solid waste: 6,200 cubic yards. Operational wastes minimal.	Construction solid waste: 1,550 cubic yards. Operational wastes minimal.	Construction solid waste: 2,650 cubic yards. Operational wastes minimal.	Construction solid waste: 4,650 cubic yards. Operational wastes minimal.

*Impacts of minor downsizing/consolidation alternatives are presented in Section 5.13.1. Preferred alternative is presented in Section 5.20.

Table 3.16-6—Summary of Impact Comparison of Flight Testing Alternatives

Resource	No Action Alternative	Mobile Upgrade Alternative	Campaign Mode at TTR Alternative			Move to NTS Alternative	Move to WSMR Alternative
			OPTION 1	OPTION 2	OPTION 3 Preferred Alternative		
Impacts to Land	No land disturbance issues. Requires Agreement extension	No land disturbance issues. Requires Agreement extension	No land disturbance issues. Requires Agreement extension	No land disturbance issues. Requires Agreement renegotiation with USAF	No land disturbance issues. Requires Agreement renegotiation with USAF. Free up 178,560 acres at Tonopah	Disturb less than 2 acres at NTS Free up 179,200 acres at Tonopah	Disturb less than 2 acres as WSMR Free up 179,200 acres at Tonopah
Noise Impacts	No noise impacts to public	Same as No Action	Same as No Action	Same as No Action	Same as No Action	Same as No Action	Same as No Action
Impact on Air Quality	No impacts to air	Same as No Action	Same as No Action	Same as No Action	Same as No Action	Temporary PM-10 emissions during construction	Temporary PM-10 emissions during construction
Socioeconomic Impacts	Currently employs 135 at Tonopah	No impact to jobs	Loss of 92 jobs at Tonopah with secondary impacts on community	Loss of 57 jobs at Tonopah with secondary impacts on community	Loss of 70 jobs at Tonopah with secondary impacts on community	Loss of 135 jobs at Tonopah with impacts to community and gain of 135 jobs at NTS	Loss of 135 jobs at Tonopah and gain of 135 jobs at WSMR
Human Health Impacts	No radiological emissions (note 1)	No radiological emissions (note 1)	No radiological emissions (note 1)	No radiological emissions (note 1)	No radiological emissions (note 1)	No radiological emissions (note 1)	No radiological emissions (note 1)
Waste Management Impacts	Small quantities of hazardous and liquid and solid non-hazardous	Same as No Action	Same as No Action	Same as No Action	Same as No Action	Same as No Action	Same as No Action

Note 1: Some Flight Test operations utilize depleted uranium in the Joint Test Assembly. There is no explosive event and the depleted uranium is contained within the weapon case. Following each flight test, the depleted uranium is removed.

Table 3.16-7—Summary of Impact Comparison of Hydrodynamic Testing Alternatives

Resource	No Action Alternative	Downsize in Place Alternative—Preferred Alternative*	Consolidate at LANL Alternative—Preferred Alternative*	Consolidate at NTS Alternative—Preferred Alternative*
Impacts to Land	No land issues	Would not require additional land	Require 5-7 acres additional land	Require 17 acres additional land
Noise Impacts	Limited to workers at facilities	Limited to workers at closure and facility sites	Limited to workers at closure construction and work sites	Limited to workers at closure construction and work sites
Impact on Air Quality	Less than 100 pounds of NOX and CO emissions/year from DARHT & CFF	Same as No Action	Construction PM-10 Emissions	Construction PM-10 Emissions
Socioeconomic Impacts	None as facilities do not employ but are used and managed by other programs	Loss of 26 jobs at LLNL Loss of 5 jobs at LANL	Loss of 56 jobs at LLNL Gain of 5 jobs at LANL	Loss of 56 jobs at LLNL Gain of 5 jobs at LANL
Human Health Impacts	No human health issues	No impacts	No impacts	No impacts
Waste Management Impacts	Small quantities of hazardous waste generated by DARHT and CFF	Additional waste from facility closures	Additional waste from facility closures	Additional waste from facility closures

***** Preferred alternative contains elements of the Downsize in-Place Alternative, the Consolidate at LANL Alternative, and the Consolidate at NTS Alternative.

Table 3.16-8—Summary of Impact Comparison of Major Environmental Test Facilities Alternatives

Resource	No Action Alternative	Downsize-in-Place Alternative	Move All ETF to NTS	Move all ETF to SNL/NM—Preferred Alternative*
Impacts to Land	Currently has 558,311 sq ft of floor space at four sites	Reduce building floor space by 62,777 sq ft	Reduce building floor space by 537,385 sq ft but require 23.5 acres of land at NTS	Reduce building floor space by 159,268 sq ft but require 2.5 acres of land at SNL/NM
Noise Impacts	Limited to workers at work sites	Limited to workers at closure and work sites	Limited to workers at closure construction and work sites	Limited to workers at closure construction and work sites
Transportation	No transportation issues	No transportation issues	Closure D&D could cause traffic congest at LANL and Sandia	Closure D&D could cause traffic congestion at LANL
Impact on Air Quality	Small emissions from Bldg 836 at LLNL	Same as no action alternative	PM-10 issues during Construction	PM-10 issues during Construction
Socioeconomic Impacts	Currently employs 29 at LANL 6 at LLNL 224 at SNL/NM	Jobs Lost: 6 at LLNL 16 at SNL/NM	Jobs Lost: 29 at LANL 6 at LLNL 224 at SNL/NM	Jobs Lost: 29 at LANL 6 at LLNL 16 at SNL/NM
Human Health Impacts	No human health issues	Same as no action alternative	Same as no action alternative	Same as no action alternative
Waste Management Impacts	Small waste generation from DAF and SNL/NM	Additional waste from facility closures	Additional waste from facility closures	Additional waste from facility closures

*Preferred alternative includes the option of moving environmental testing of nuclear explosive packages currently performed in LLNL Building 334 and the Building 834 environmental conditioning functions to Pantex by 2012.